B-107-M-1

cc: Maywood
USEPA

JHK
HAP

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

AT&T

AT&T Bell Laboratories

2000 North Naperville Road
Naperville, Illinois 60566-7033
708 979-2000

September 28, 1992

Mr. Lawrence W. Eastep, P.E.
Manager, Permit Section
Division of Land Pollution Control
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

Re: AT&T Bell Laboratories Indian Hill Facility
DLPC #0438050004 - DuPage County
ILD068608314
Part B Permit Log #107

Dear Mr. Eastep:

In response to the Illinois Environmental Protection Agency's review of the Certification Report for Closure of the Concentrated Waste Storage Tank System dated August 12, 1992, we offer the following information:

1. AT&T failed to notify the Agency's DLPC in writing of its intent to close the tank system at least 180 days prior to the date closure was expected to begin. As a result, AT&T conducted closure activities without Agency approval.

   Response:
   Notice of our intention to close the tank system was included in the Part B Permit Application which was submitted in final form in February 1990. Appendix D contained a specification for Environmental Engineering Management Services covering closure of the old Concentrated Waste Storage Tank System (CWSTS). The permit application also contained, in Appendix C, plans and specifications for construction of a new CWSTS.

   The final Part B Permit which was issued on September 28, 1990 included authorization to construct the new CWSTS in Section II. The authorization to construct included language that the tank system must be constructed in accordance with the approved permit application, namely Appendix C. The summary of Section II also stated that the existing CWSTS was being replaced with a new system. Since it was impossible to construct the new CWSTS without removing the old CWSTS, we assumed that this authorization to construct the new CWSTS implicitly authorized closure of the old CWSTS. Apparently we were mistaken in believing that the Part

B permit application provided the Agency with notice of the intention to close the old CWSTS.

We do wish to note, however, that Condition K.1 of Section II requires that the "Permittee shall notify the Agency's DLPC in writing of its intent to close the tank system at least 180 days prior to the date closure is expected to begin. Along with this notification, the Permittee shall submit the sampling and analysis plan to be used in demonstrating that the tank system has been properly decontaminated. This plan must not be implemented prior to approval by the Agency's DLPC." Since the sampling and analysis plan for decontamination and closure of the old system had been submitted as part of the Part B permit application, we assumed that this provision was applicable to the new CWSTS, the construction of which was approved in the Part B permit, and not to the existing system which had to be removed in order to construct the new system.

2. Soil sampling and analytical results included in the report indicate that all soil contamination was not remediated. These results also appear to indicate that the contamination may be localized. However, the level of contaminants that would remain in the soil exceeds the Agency's soil cleanup objectives, which are provided below. (Table not reproduced.)

Response:
We believe that the remaining contamination is localized and does not pose any threat to the environment. The PC shop is located on the interior of the first floor of the Indian Hill facility, approximately 100 feet from the nearest outside wall (located to the west and atrium wall located to the east(see site map included in Attachment 1)) and the area is not exposed to any infiltration which could cause any remaining contamination to migrate into the groundwater. In addition, the depth to groundwater is approximately 15-16 feet and which precludes the possibility that the area would be subject to saturation by groundwater. Furthermore, there is a utility pipe tunnel under the a portion of the PC Shop which is at a lower elevation than the bottom of the excavation in the PC Shop which creates a barrier to any rise in groundwater to an elevation necessary to solubilize any contamination remaining in the area. Consequently, there is no mechanism by which any remaining contamination could migrate from its current location to the groundwater.

3. Sampling and analytical results indicate that inorganic (metals) concentrations are reported as totals. The soil cleanup objectives for inorganic parameters listed in Item 2 above are TCLP concentrations.

Response:
The analytical results that were presented in the Closure Report are for total metals.

Unfortunately the samples are only retained by the laboratory for a period of one year and are no longer available for additional analysis. The area where the contamination occurred has been backfilled and a new concrete floor installed with all new lab equipment. A curbed spill containment area was also installed above the existing floor using high strength concrete and sealed with a chemical corrosive resistant coating prior to the reinstallation of the PC Shop equipment. Any attempt to obtain additional samples would not be feasible since the entire lab and floor slab would have to be removed. Furthermore, examination of Photos #21 and #22 of the Closure Report indicate that the limits of the excavation were within several feet of the PC shop wall. This wall is a load bearing wall and expanding the excavation would have been extremely difficult.

4. Closure costs were not provided, as required by Condition K.8.e of Section II of the RCRA Part B permit.

Response:
The total cost for closure of the old CWSTS, including engineering services, decontamination activities, demolition activities, sampling, analytical, disposal and preparation of the Closure Report was $130,537.76.

5. Only two (2) background samples were collected for analysis. A minimum of ten (10) background samples from each soil stratum is required, as indicated on page 9 of the Agency's closure plan instruction package.

Response:
The specifications for closure of the old CWSTS, included as Appendix D of the Part B permit application, required background samples. Since we were performing the closure under the belief that IEPA had reviewed and approved the closure plan during the Part B permit application review, we were unaware of the requirement for a minimum of ten background samples. However, the two background samples which were collected are believed to be representative of the soils in the direct vicinity of the CWSTS and associated piping because, with the exception of S-6 (PC Shop soil sample), all of the soil sample analytical results were within a relatively narrow range and were also within the range of values reported as typical by Region V.

6. Classification of the groundwater at your facility must be made in accordance with 35 Ill. Adm. Code Part 620 - Groundwater Quality Standards. The Agency will assume the groundwater beneath the hazardous waste storage tank is of Class I quality, as defined in 35 IAC Section 620.210, unless a hydrogeological characterization (i.e. soil boring logs, water well logs, pump tests, etc.) is performed to demonstrate that another classification is appropriate. This hydrogeological

characterization must be submitted to the Agency for review and approval by October 1, 1992.

Response:
Attachment 1 contains several representative soil boring logs from a recent fuel oil tank removal project located to west of the PC Shop. Attachment 2 contains a description of the geology and hydrogeology of the site from a recent submittal for a RCRA Facility Investigation Work Plan. We believe that this information supports the inference that the soil contamination remaining below the PC shop does not pose a threat to groundwater in the area. We have not performed a formal hydrogeological investigation, but we are prepared to do so if the information contained in this submittal is not sufficient for the Agency to make a determination regarding the impact of the remaining soil contamination.

In summary, we believe that the residual contamination remaining in the soils below the PC Shop does not pose a threat to the environment or to groundwater in the area because there is no mechanism by which the contamination could be transported to the groundwater due the depth and location of the contamination. This lab location is within the confines of our main building structure and is not readily subject to migration patterns as an outside location would be.

We hope that the information provided adequately addresses the concerns raised during IEPA's review of the Closure Report for the Concentrated Waste Storage Tank System. All return correspondence regarding this submission should be directed to Mr. Paul Wyszkowski, P.E., Manager, Environmental Management Department, AT&T Bell Laboratories, Room 3B-237A, 600 Mountain Avenue, Murray Hill, NJ, 07974. If you have any questions or require any additional information, please do not hesitate to contact the writer at (708) 979-4649.

Very truly yours,

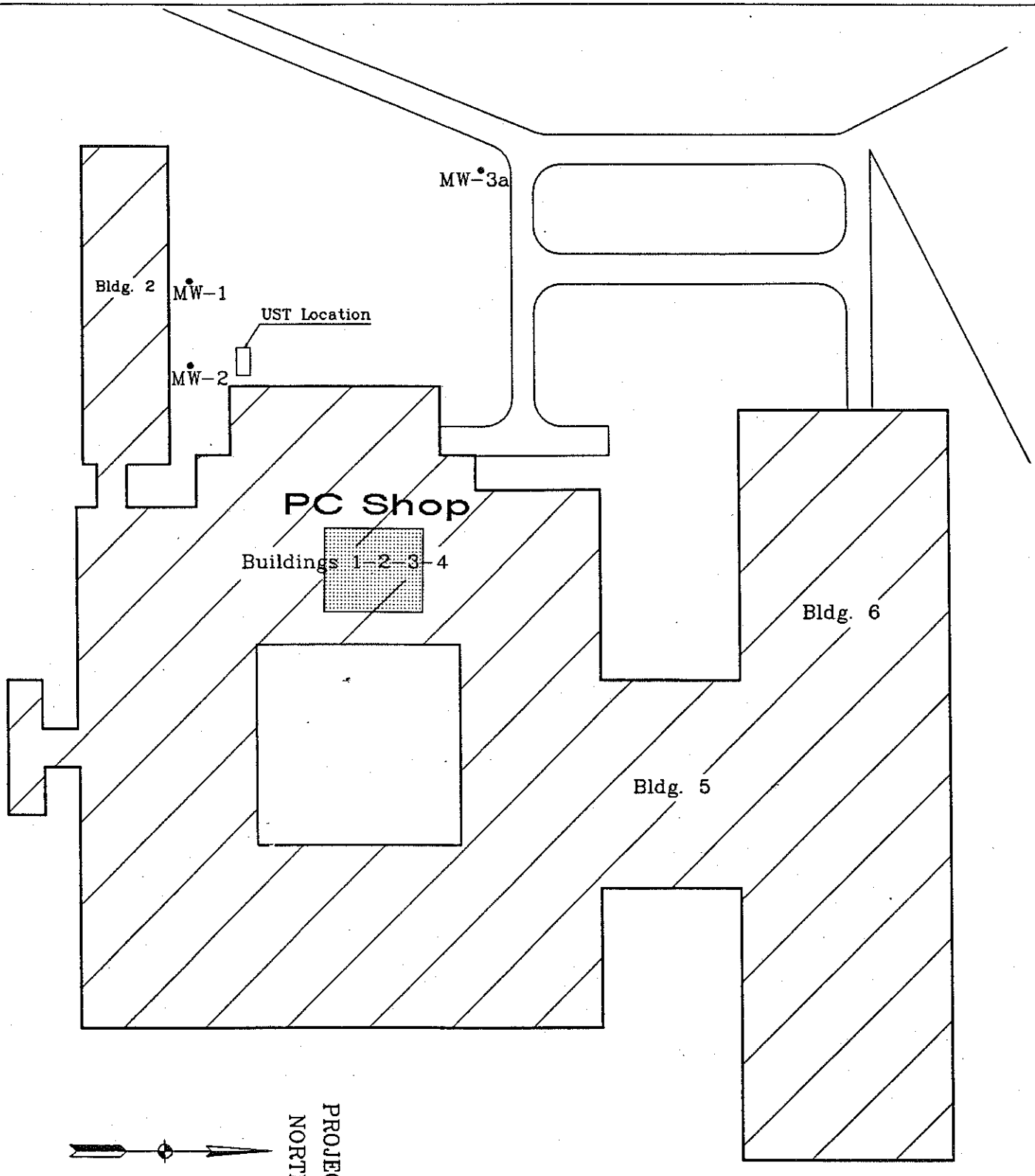
Patrick M. Dowd

Patrick M. Dowd, P.E.
Environmental Management Specialist

Attachments

ATTACHMENT 1

SOIL BORING LOGS



Monitoring Well Location

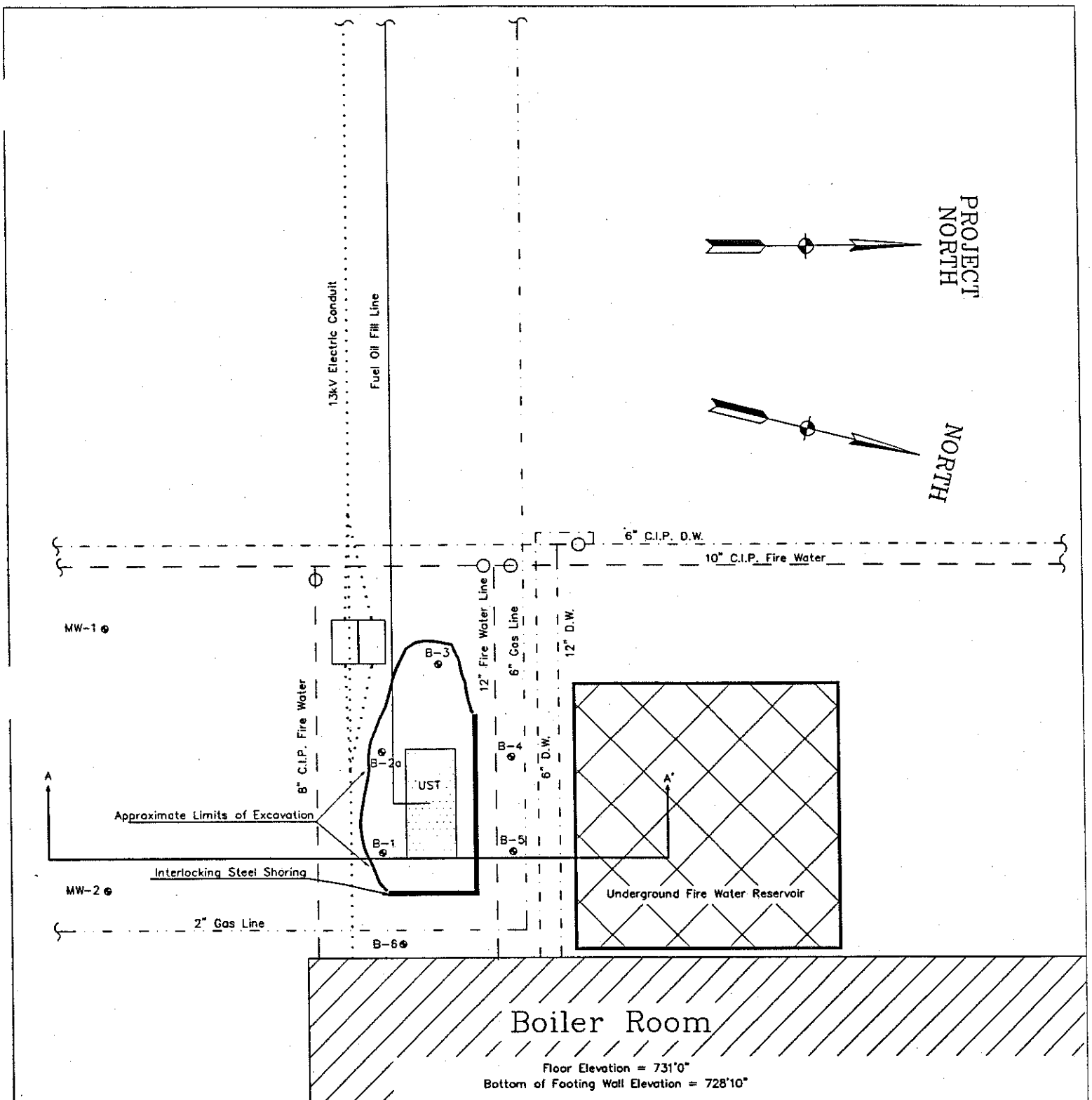
AT&T INDIAN HILLS FACILITY
NAPERVILLE, ILLINOIS

SITE MAP

REVISIONS

HERITAGE REMEDIATION/ENGINEERING, INC.

	DRAWN BY RPW	DATE 28 MAY 1992	FIGURE 2
ATTNAP2	APPROVED BY	SCALE Approx. 1"=100'	JOB NO. 4395



AT&T INDIAN HILLS FACILITY
NAPERVILLE, ILLINOIS

UST EXCAVATION DETAIL

REVISIONS			
	HERITAGE REMEDIATION/ENGINEERING, INC.		
	DRAWN BY RPW	DATE 30 JUNE 1992	FIGURE 3
ATTNAP3	APPROVED BY	SCALE Approx. 1"=30'	JOB NO. 4395

SOIL TEST BORING LOG — LOG No. : B-6

HERITAGE REMEDIATION/ENGINEERING, INC.
1319 MARQUETTE DRIVE
ROMEOVILLE, ILLINOIS 60441
PHONE 708-378-1600
FAX 708-378-2200

SITE LOCATION: AT&T
2000 N. NAPERVILLE RD.
NAPERVILLE, ILLINOIS

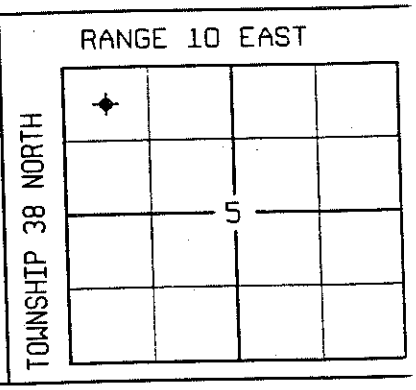
HR/E JOB No. : 4395

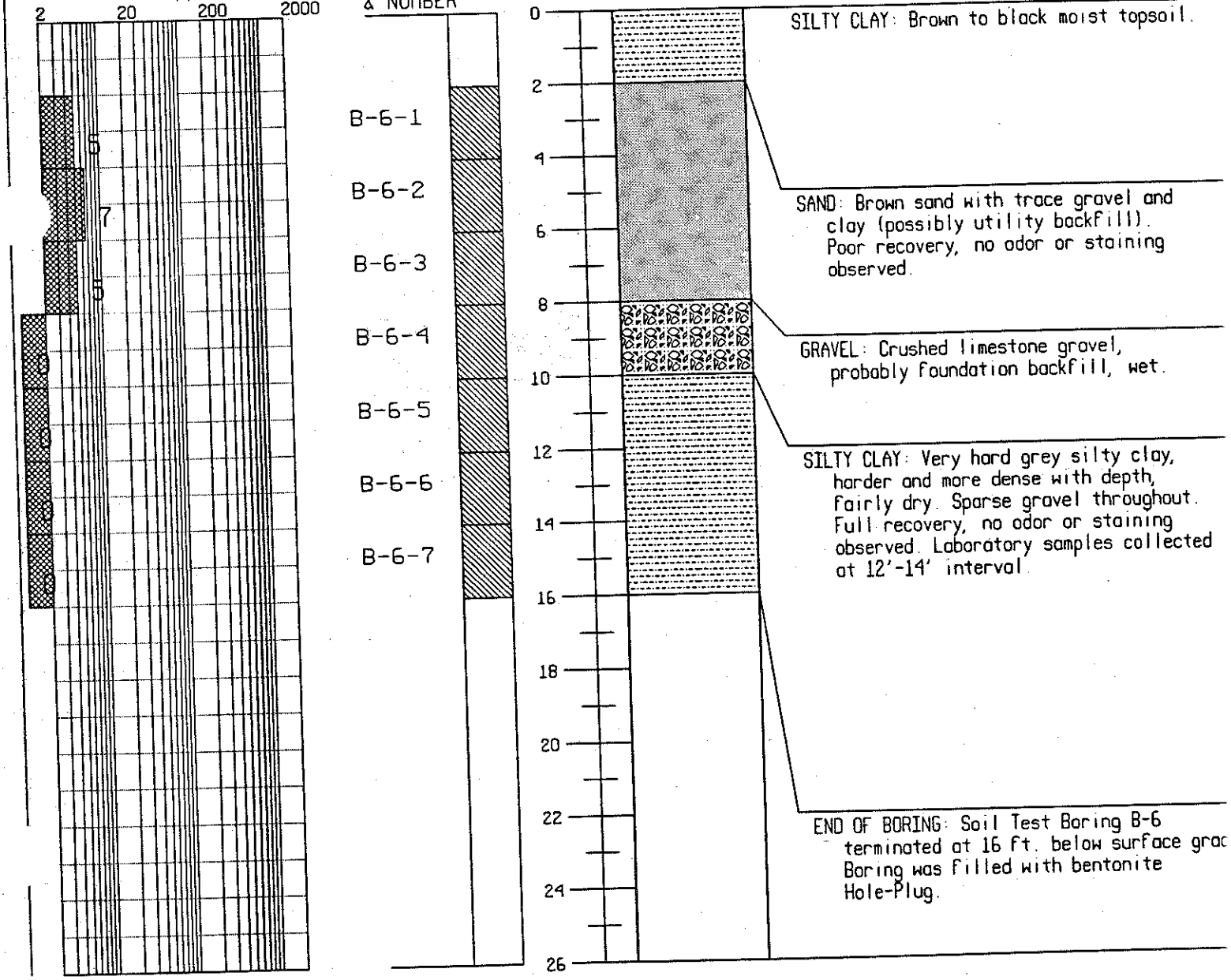
DRILLING Co: EXPLORATION TECHNOLOGY
DRILL RIG: D-50
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2 ft. SPLIT-SPOON
DRILLER: KEVIN McCUMBER
PROJECT GEOLOGIST: KEVIN REINHARD
PROJECT ENGINEER: ROBERT MILLMAN
START: 0900 05/12/92
END: 1000 05/12/92

COORDINATES:
X: SEE SITE MAP
Y: SEE SITE MAP
Z: APPROX. 750 ft.

WEATHER: 55F
SUNNY

EST. WATER LEVEL: NOT OBSERVED





SOIL TEST BORING LOG LOG No. : B-5

HERITAGE REMEDIATION/ENGINEERING, INC.
1319 MARQUETTE DRIVE
ROMEOVILLE, ILLINOIS 60441
PHONE: 708-378-1600
FAX: 708-378-2200

SITE LOCATION: AT&T
2000 N. NAPERVILLE RD.
NAPERVILLE, ILLINOIS

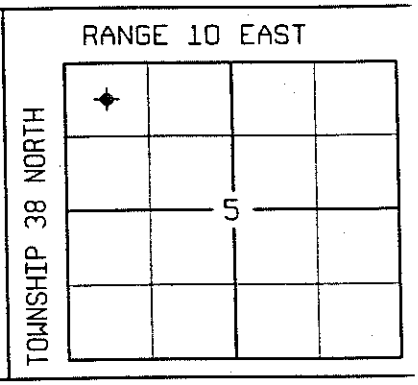
HR/E JOB No.: 4395

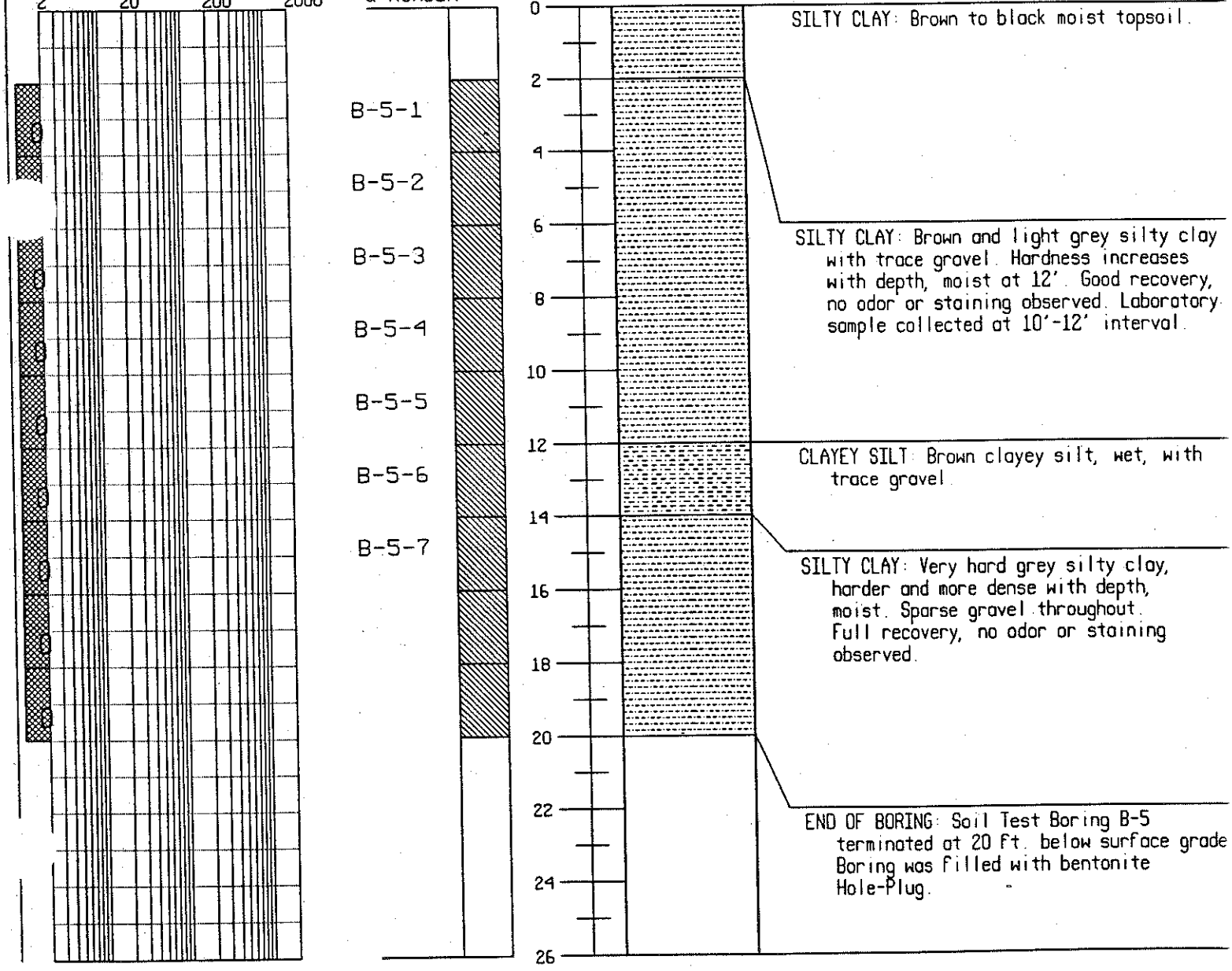
DRILLING Co: EXPLORATION TECHNOLOGY
DRILL RIG: D-50
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2 ft. SPLIT-SPOON
DRILLER: KEVIN McCUMBER
PROJECT GEOLOGIST: KEVIN REINHARD
PROJECT ENGINEER: ROBERT MILLMAN
START: 1020 05/12/92
END: 1115 05/12/92

COORDINATES:
X: SEE SITE MAP
Y: SEE SITE MAP
Z: APPROX. 750 ft.

WEATHER: 55F
SUNNY

EST. WATER LEVEL: NOT OBSERVED





SOIL TEST BORING LOG — LOG No.: B-4

HERITAGE REMEDIATION/ENGINEERING, INC.
1319 MARQUETTE DRIVE
ROMEOVILLE, ILLINOIS 60441
PHONE 708-378-1600
FAX 708-378-2200

SITE LOCATION: AT&T
2000 N. NAPERVILLE RD
NAPERVILLE, ILLINOIS

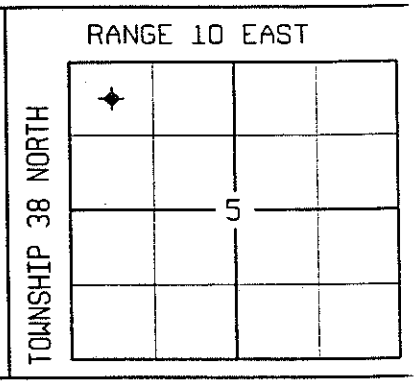
HR/E JOB No.: 4395

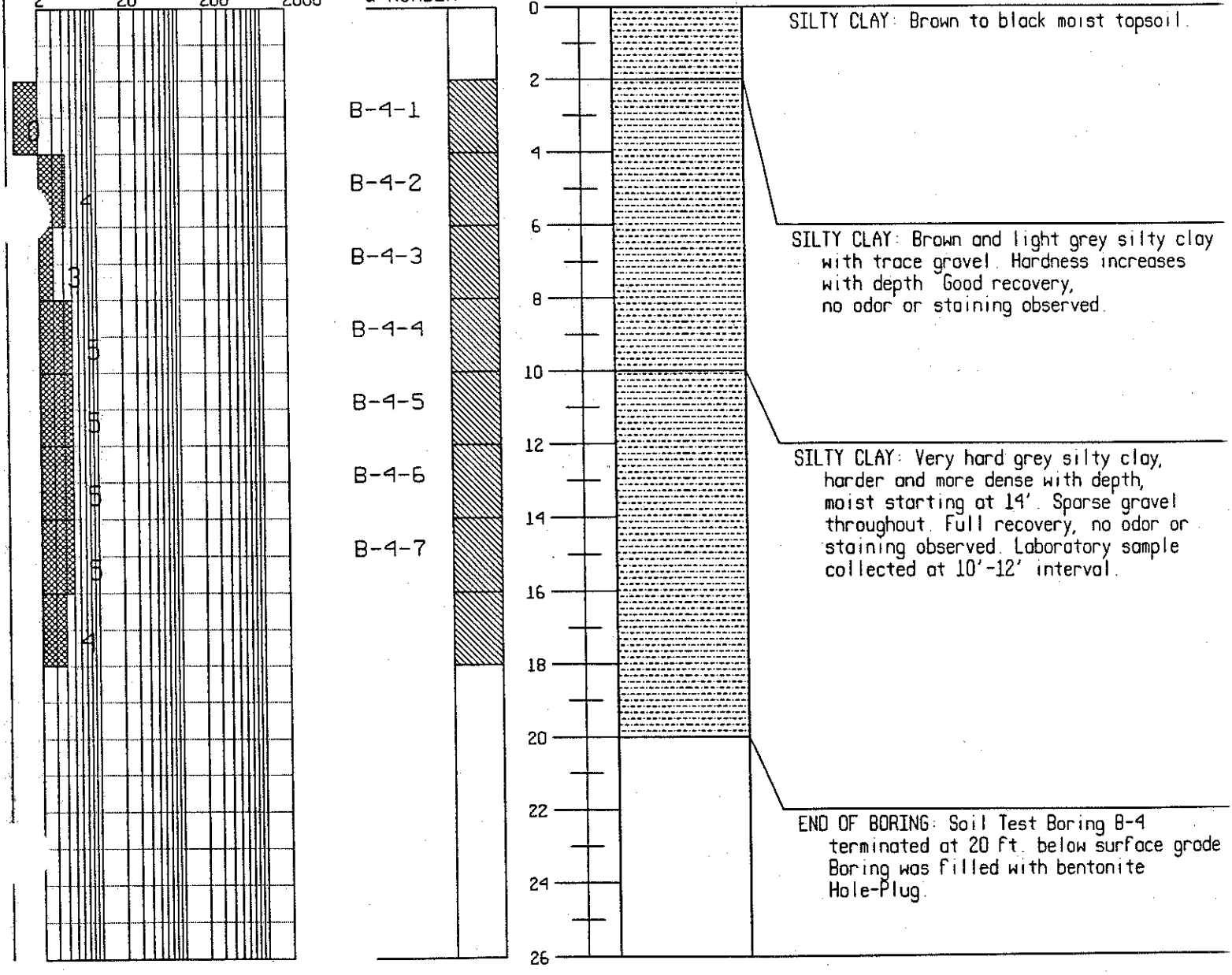
DRILLING Co: EXPLORATION TECHNOLOGY
DRILL RIG: D-50
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2 ft. SPLIT-SPOON
DRILLER: KEVIN McCUMBER
PROJECT GEOLOGIST: KEVIN REINHARD
PROJECT ENGINEER: ROBERT MILLMAN
START: 1230 05/12/92
END: 1320 05/12/92

COORDINATES:
X: SEE SITE MAP
Y: SEE SITE MAP
Z: APPROX. 750 ft.

WEATHER: 55F
SUNNY

EST. WATER LEVEL: NOT OBSERVED





SOIL TEST BORING LOG — LOG No. : B-3

HERITAGE REMEDIATION/ENGINEERING, INC.
1319 MARQUETTE DRIVE
ROMEOVILLE, ILLINOIS 60441
PHONE: 708-378-1600
FAX: 708-378-2200

SITE LOCATION: AT&T
2000 N. NAPERVILLE RD.
NAPERVILLE, ILLINOIS

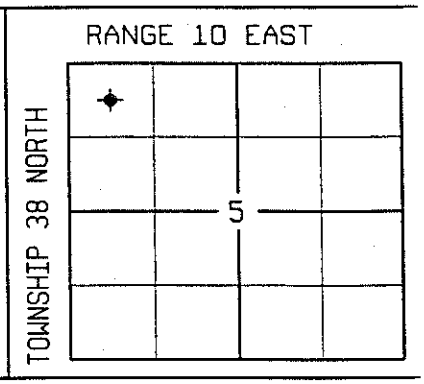
HR/E JOB No.: 4395

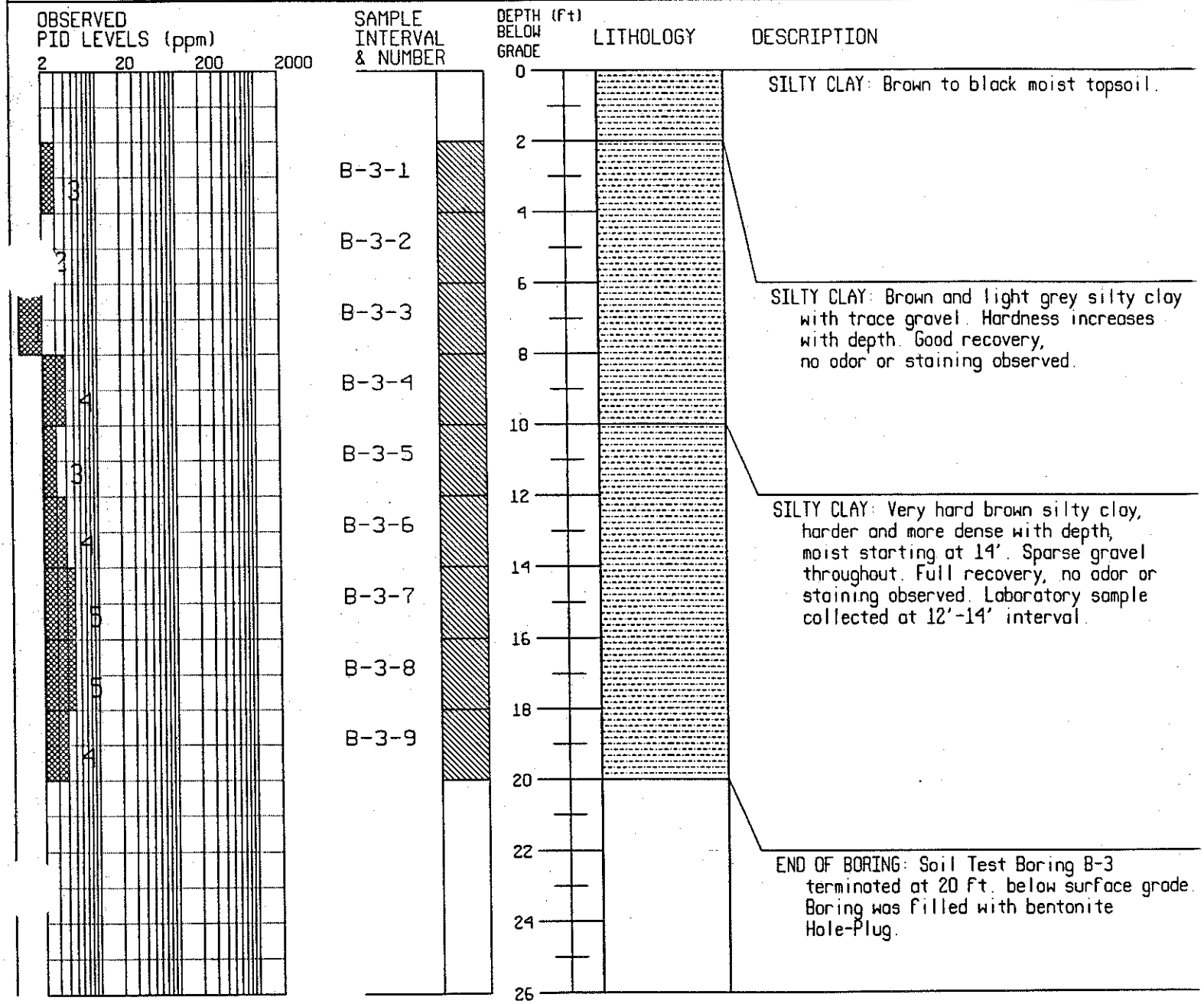
DRILLING Co: EXPLORATION TECHNOLOGY
DRILL RIG: D-50
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2 ft. SPLIT-SPOON
DRILLER: KEVIN McCUMBER
PROJECT GEOLOGIST: KEVIN REINHARD
PROJECT ENGINEER: ROBERT MILLMAN
START: 1405 05/12/92
END: 1500 05/12/92

COORDINATES:
X: SEE SITE MAP
Y: SEE SITE MAP
Z: APPROX. 750 ft.

WEATHER: 55F
SUNNY

EST. WATER LEVEL: NOT OBSERVED





SOIL TEST BORING LOG — LOG No.: B-2a

HERITAGE REMEDIATION/ENGINEERING, INC.
1319 MARQUETTE DRIVE
ROMEOVILLE, ILLINOIS 60441
PHONE: 708-378-1600
FAX: 708-378-2200

SITE LOCATION: AT&T
2000 N. NAPERVILLE RD.
NAPERVILLE, ILLINOIS

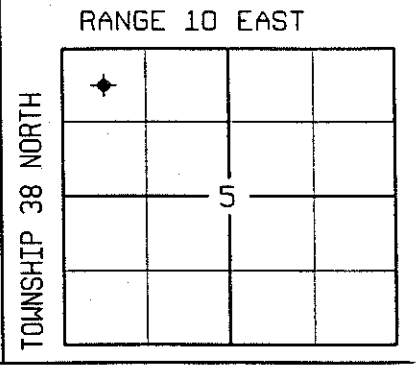
HR/E JOB No.: 4395

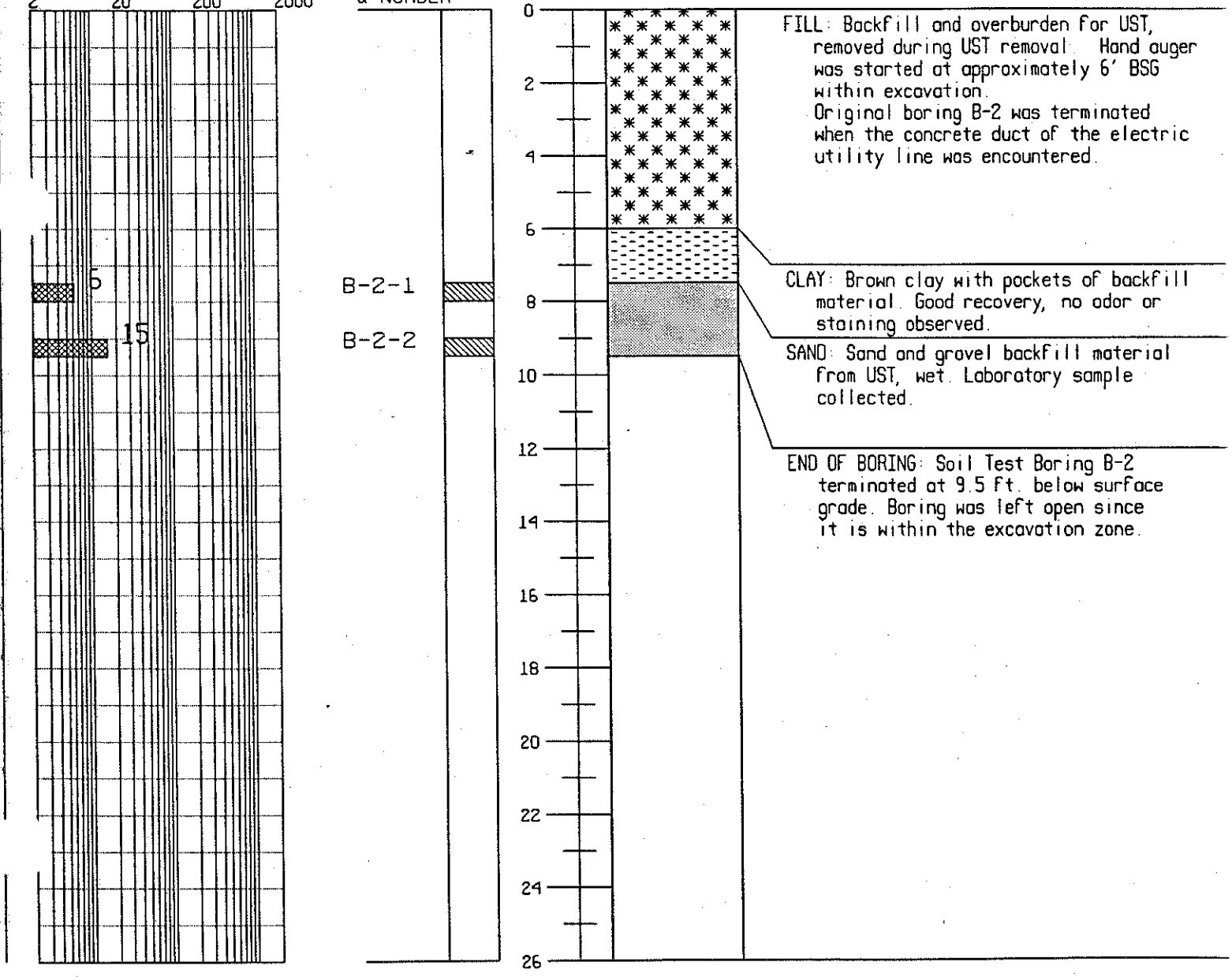
DRILLING Co: HR/E
DRILL RIG: N/A
DRILLING METHOD: HAND AUGER
SAMPLING METHOD: BARRELL AUGER
DRILLER: KEVIN CRANDELL
PROJECT GEOLOGIST: SCOTT MITCHELL
PROJECT ENGINEER: ROBERT MILLMAN
START: 05/12/92
END: 05/12/92

COORDINATES:
X: SEE SITE MAP
Y: SEE SITE MAP
Z: APPROX. 750 Ft.

WEATHER: 55F
SUNNY

EST. WATER LEVEL: APPROX. 9' BSG





SOIL TEST BORING LOG LOG No. : B-1

HERITAGE REMEDIATION/ENGINEERING, INC.
1319 MARQUETTE DRIVE
ROMEOVILLE, ILLINOIS 60441
PHONE: 708-378-1600
FAX: 708-378-2200

SITE LOCATION: AT&T
2000 N. NAPERVILLE RD.
NAPERVILLE, ILLINOIS

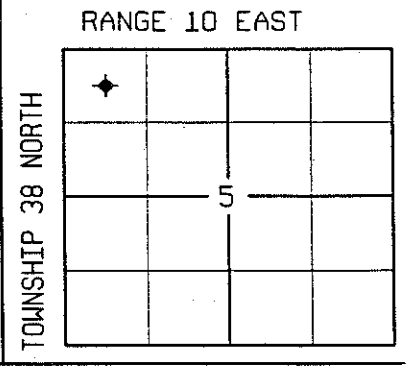
HR/E JOB No.: 4395

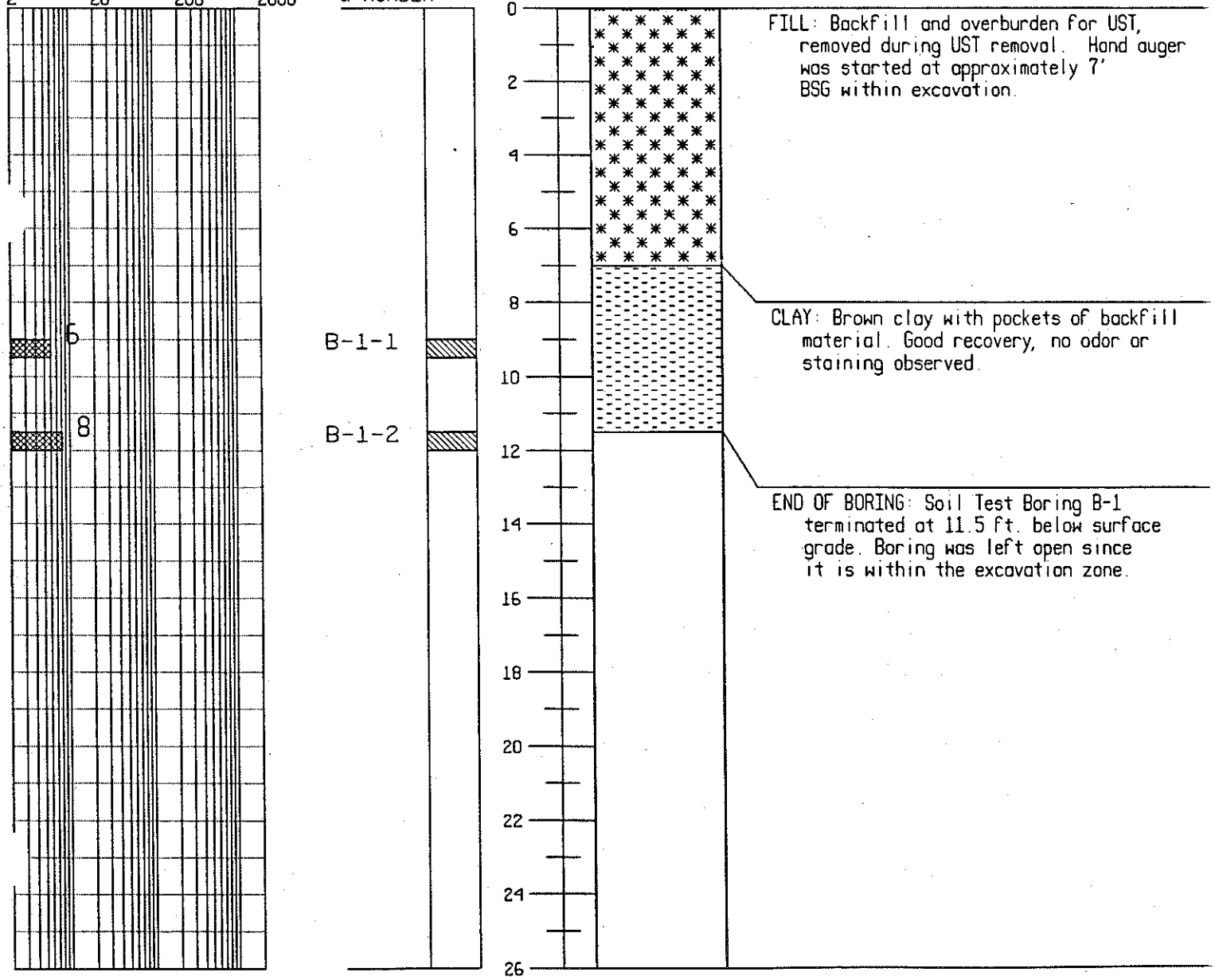
DRILLING Co: HR/E
DRILL RIG: N/A
DRILLING METHOD: HAND AUGER
SAMPLING METHOD: BARRELL AUGER
DRILLER: KEVIN CRANDELL
PROJECT GEOLOGIST: SCOTT MITCHELL
PROJECT ENGINEER: ROBERT MILLMAN
START: 05/12/92
END: 05/12/92

COORDINATES:
X: SEE SITE MAP
Y: SEE SITE MAP
Z: APPROX. 750 Ft.

WEATHER: 55F
SUNNY

EST. WATER LEVEL: APPROX. 9' BSG





ATTACHMENT 2

GEOLOGICAL/HYDROGEOLOGICAL INFORMATION

b. Quantities

The amount of material that was released into the environment is not able to be determined at this time.

c. Constituents

The only compounds detected by a volatile compound analysis conducted on a soil sample obtained in January 1985 from below the tank excavation were toluene and benzene. The concentrations of toluene and benzene were 9.3 and 8.0 parts per million respectively. The complete results of the analyses are presented in Table III.

d. Identification of areas where additional information is necessary

All the necessary information to proceed with this investigation which will determine the extent of soil contamination, chemicals involved and their concentrations has been obtained. The investigation will also determine whether or not a groundwater investigation is necessary.

2. Assessment/Description

a. Monitoring Data

The only monitoring data available are the results from the one soil sample detecting 9.3 ppm toluene and 8.0 ppm benzene.

b. Migration Pathways

(1) Geology

The geology in the area of the Indian Hill Facility of the AT & T Bell Laboratories typically consists of Paleozoic Era bedrock formations that are unconformably overlain by unconsolidated sediments of the Quaternary Period. The rocks that immediately underlie the unconsolidated sediments were emplaced during the Silurian Period and Ordovician Period of the Paleozoic. The unconsolidated materials were deposited during the Late Wisconsinan Stage (i.e., Woodfordian Stade) of the Pleistocene Epoch and are reported to be between 50 feet and 200 feet thick, depending on the bedrock topography underlying the location. Water well logs of wells constructed on the AT&T site indicate that the unconsolidated sequence is approximately 90 feet thick above the bedrock (Figure 4, Appendix E). The following sections contain descriptions of the geologic units that have been reported or observed within the subsurface at the site, from youngest to oldest.

(a) Unconsolidated

The site is located in the West Chicago and Wheaton Moraines of the Valpariso Moranic System. This system is a group of glacial moraines that represent the relative positions of the glacial margin during minor pauses of the recession (i.e, deglaciation) of its ice front.

The Richland Loess Formation is the uppermost geologic unit in the area. This formation typically is less than 3 feet thick and consists of windblown silt and fine sand that sporadically covers the moranic deposits. The Richland loess was deposited soon after the glacial-ice retreat before the exposed sediment were stabilized by vegetation, and are usually found within the dark, organic-rich "A" soil horizon (i.e., top soil).

Between the Richland Loess and the underlying bedrock formations are both diamictons (i.e., till: a poorly sorted sediment containing large clasts within a fine, clay-rich matrix) and well sorted sand and gravels of the Wedron Formation. The upper portion of the Wedron Formation consists of gray, well compacted, pebbly, silt and clay till and discontinuous lenses of sand and gravel of the Wadsworth Till Member and the Yorkville Till Member. These two till members are not easily differentiated but were recognized within the water well logs as a "clay" unit, which range in thickness from 45 feet to 70 feet at the site. The Wadsworth Till and Yorkville Till members were rapidly deposited at the margins of the retreating glacier.

Beneath the Wadsworth and Yorkville tills was found a 20 feet to 45 feet thick sand unit directly overlying the bedrock. This unit is identified as the Malden Outwash, which is a well sorted sand and gravel unit that was deposited by glacial meltwater streams. The Malden Outwash is reported to be discontinuous in the region but is well developed beneath the site.

(b) Bedrock

The bedrock at the facility was penetrated to a depth up to 335 feet below grade during the construction of three on-site water wells. Two major bedrock units were identified by the drillers: Limerock and shale. The upper or "limerock" portion of the stratigraphy are interpreted as the Racine, Sugar Run, Joliet, Kankakee, Elwood and Wilhelmi Formations of the Silurian Period. These Silurian formations are predominantly dolomite and dolomitic shales of the Hunton Megagroup. The lower portion of the Silurian (e.g., Wilhelmi Formation) unconformably overlies the Maquoketa Group of the Ordovician Period. The break between the Wilhelmi Formation and the Brainard Formation of the Maquoketa Group is interpreted to be between 225 feet and 229 feet below grade. Typically, it is difficult to distinguish between these two formations because of their similarities; however, the green shale and pink limestone of the underlying Fort Atkinson Limestone Formation of the Maquoketa Group were readily distinguished at 335 feet in the log of Well No. 3.

(2) Hydrogeology

(a) Unconsolidated

The unconsolidated formations are part of the Prairie Aquigroup or aquifer system. Typically, the till units within the aquigroup would be classified as aquitards, and the sand and gravel units as aquifers (if water saturated). Groundwater is primarily stored within and released from the pore space between individual clasts within the unconsolidated formations. Sand and gravel deposits are usually very permeable and may yield significant volumes of water, and allow water to move rapidly through their pores. Diamictons (tills) typically have very low porosity and do not yield large volumes of water, and they usually restrict groundwater movement.

Several soil borings and monitoring wells have been installed at the site during past investigations and removal of underground storage tanks (UST's). Well logs from these

Several soil borings and monitoring wells have been installed at the site during past investigations and removal of underground storage tanks (UST's). Well logs from these activities indicate that the borings and wells penetrated a combination of natural soil fill, topsoil and a portion of the Wadsworth Till Member of the Wedron Formation. The water table was reported to have been between 10 feet and 16 feet below grade. However, several of the wells reportedly required several months for the water to seep in and equilibrate. Therefore, it is concluded from this information that the till units behave as an aquitard at the site. No naturally deposited sand lenses were reported to have been intersected within the till during the UST investigations. Small discontinuous lenses of water saturated sand, if present in the subsurface normally do not release enough water to be considered a viable aquifer because they are not directly connected to a good recharge source. However, these sand lenses may locally provide an avenue for more rapid movement of groundwater than the surrounding till.

The outwash sand of the Malden Formation is likely to be a viable aquifer beneath the site, although this formation was not developed or tested during the drilling of the on-site water wells. Groundwater contained within this formation may yield large quantities of groundwater if hydraulic connection to a recharge source exists nearby. This formation may potentially recharge the bedrock system or function as part of that aquifer system.

(b) Bedrock

The dolomite and shale formations beneath the site lie within the Upper Bedrock Aquigroup. Groundwater is typically derived from secondary porosity features (i.e., fractures, joints and bedding plane partings) within this aquifer system. Recharge to the bedrock aquifer is usually significant in areas overlain by permeable unconsolidated formations such as those at the site. The dolomite (Silurian) formations are in direct hydraulic communication with the overlying Malden Formation of the Prairie Aquigroup and represent a significant aquifer system. One of the on-site water wells is reported to have a sustained pumping rate of 340 gpm after 8 hours of pumping, and a drawdown of only 6 feet, which supports this phenomenon. The static water level of the three on-site water wells within this bedrock aquigroup was reported to be approximately 30 feet below grade at the time of the construction.

The underlying Maquoketa Group (Ordovician) is considered an aquitard (confining horizon) because of its abundance of unfractured shales; however, limestone formations or fractured portions of the upper formations of this group may behave as localized aquifers. The Maquoketa shale effectively isolates and confines older underlying aquifer systems from the overlying Prairie Aquigroup

The site geology suggests a predominance of stiff clay with the groundwater table at 25 feet below grade. However, the potential for silt or sand lenses occurring at the site is not being excluded at this time. In addition, other than the pipe to the former VWST there are no known man-made structures which would offset migration.

Because any release which may have occurred would have been to subsurface soils migration of non-chlorinated volatiles is expected to be limited to nearby soils unless silt or sand lenses are encountered. Chlorinated volatiles would be expected to migrate vertically until reaching the groundwater. Migration at that point would depend on solubility and soil/water partition coefficients of specific compounds. Semi-volatiles are less mobile and

are expected to be limited to soils near the releases. Because the releases would have been to subsurface soils, runoff, run-on and volatilization into the air are not considered significant potential migration pathways.

c. Potential Impact

Because, as discussed above, the release was to subsurface soils, the potential impacts identified are nearby subsurface soils and groundwater (Figures 5 and 6, Appendix E).

C. ADMINISTRATIVE OUTLINE

1. RFI Objectives

The objective of this RFI is to obtain data of sufficient quality to determine 1) whether a release occurred from the 1,000 gallon volatile waste underground storage tank, 2) the extent and magnitude of hazardous waste constituents that may have been released into the soil, and 3) whether groundwater may have been impacted.

2. Technical Approach

The overall approach is to conduct a soil boring investigation to determine whether a release occurred from the VWST, the vertical extent, the areal extent, and whether groundwater has been impacted.

The Field Sampling Plan calls for establishing a sampling grid based on IEPA RCRA Closure criteria which will cover the area below the tank, soils near the excavation walls, surrounding soils, and along the tank fill pipe.

The plan specifies drilling the borings until groundwater is encountered. Field-screening techniques consisting of measurement of photoionization detector, and visual inspection will be used to select samples for analysis.

The first area of concern is the exact location were the tank was installed. One boring at each end of the concrete slab that anchored the tank will determine if the contamination still exists and if the contamination has traveled downward and reached the shallow aquifer.

The second area to be examined is the one surrounding the tank. Soil borings will be drilled near each wall of the former excavation to obtain soil and water samples for laboratory analysis. Additional borings will be placed in a 10-foot by 10-foot grid around the former excavation. The results of the analyses will determine if contamination from the tank is migrating, and if so in what direction, and approximately how fast.

The third area to be looked at will be the associated piping. To determine if the piping was the source of the contamination soil borings every 20 feet will be conducted.

The last areas to be examined will be upgradient and downgradient. The upgradient location will determine if the contamination is from another source and migrated to the tank area. The downgradient location will determine if the contamination from the tank has

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

See Section II

EFFECTS OF OVEREXPOSURE

Very irritating to eyes, nose, throat and skin.

EMERGENCY AND FIRST AID PROCEDURES

EYES: Flush with water for 15 minutes. Contact physician.
SKIN: Flush with water. Wash with vinegar.
INTERNAL: As for caustic soda.

SECTION VI - REACTIVITY DATA

UNSTABLE		**CONDITIONS TO AVOID**
STABLE	X	

INCOMPATIBILITY (MATERIALS TO AVOID)

Avoid contact with acid or acidic materials

HAZARDOUS DECOMPOSITION PRODUCTS

Oxides of carbon

HAZARDOUS POLYMERIAZTION		**CONDITIONS TO AVOID**
MAY OCCUR		
WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED - WEAR PROTECTIVE CLOTHING. NEVER DISCHARGE DIRECTLY INTO SEWERS OR WATERWAYS.

Flush residue with water to chemical drain. Sweep up excess material.

WASTE DISPOSAL METHOD - ALWAYS CHECK AND COMPLY WITH GOVERNMENT DISPOSAL REGULATIONS.

Neutralize to pH 6 - 8 and discard. Contain phosphates and silicates. Consult local regulations before discarding. Phosphates can be precipitated be lime.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE)

Dust mask

VENTILATION	**LOCAL EXHAUST** N/A	**SPECIAL** N/A
	MECHANICAL (GENERAL) X	**OTHER** N/A

PROTECTIVE GLOVES Rubber	**EYE PROTECTION** Face shield

OTHER PROTECTIVE EQUIPMENT

Rubber apron/boots

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Store in dry area, in tightly closed container.

OTHER PRECAUTIONS

N/A

PREPARED BY: Cherrie Gillis **DATE:** 11/16/84

10207

MATERIAL SAFETY DATA SHEET

(R) 4/30/87

CODE 19120

SECTION 1

Manufacture's Name MacDermid Incorporated	EMERGENCY TELEPHONE 203-575-5700
ADDRESS (Number, Street, City, State, Zip Code) 526 Huntingdon Avenue Waterbury, CT. 06720	MFSA EMERGENCY 24 HOUR HOTLINE: (313) - 644 - 5626
CFR-49 - DOT Proper Shipping Name Ammonium Hydroxide, Mixture, Corrosive Material, NA 2672	
CHEMICAL NAME AND SYNONYMS N/A	TRADE NAME AND SYNOMYM: Metex Etchant MU-A
CHEMICAL FAMILY Ammonium Compound	FORMULA Mixture

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVE & SOLVENTS	%	TLV (UNITS)	ALLOYS & METALLIC COATINGS	%	TLV (UNITS)
	N/A			N/A	
PIGMENTS	"		BASE METAL	"	
CATALYST	"		ALLOYS	"	
VEHICLE	"		METALLIC COATINGS	"	
SOLVENTS	"		FILLER METAL PLUS OR CORE FLUX	"	
ADDITIVES	"		OTHERS	"	
OTHERS	"				

HAZARDOUS MIXTURES OR OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (UNITS)
Ammonia (7664-41-7)	20	25ppm *
* as NH_3		

SECTION III - PHYSICAL DATA

BOILING POINT (F)	<212	SPECIFIC GRAVITY (H_2O = 1)	1.07
VAPOR PRESSURE (MM. HG.)	Aqueous	PERCENT VOLATILE BY VOLUME (%)	8
VAPOR DENSITY (AIR = 1)	<1	EVAPORATION RATE (= 1)	<1
SOLUBILITY IN WATER	Complete		

APPEARANCE AND ODOR
Water white liquid with ammonia odor.

SECTION IV = FIRE AND EXPLOSION HAZARD DATA

		~~LEL~~	~~UEL~~
FLASH POINT (METHOD USED) Non flammable	FLAMMABLE LIMITS N/A		

EXTINGUISHING MEDIA
As appropriate for surrounding material.

SPECIAL FIRE FIGHTING PROCEDURES
Wear self contained breathing apparatus due to possible presence of ammonia gas.

UNUSUAL FIRE AND EXPLOSION HAZARDS
When heated will emit ammonia gas.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
Not established for product, see section II.

EFFECTS OF OVEREXPOSURE-UNLESS OTHERWISE STATED, CHRONIC OR LONG-TERM HEALTH EFFECTS UNKNOWN!
Can cause irritation of eyes, skin, mucous membranes.

EMERGENCY AND FIRST AID PROCEDURES
Eyes: Flush with water for 15 minutes. Contact physician.
Skin: Flush with water.
Internal: Give water, do not induce vomiting. Contact physician.
Inhalation: Remove to fresh air.

SECTION VI - REACTIVITY DATA

UNSTABLE		**CONDITIONS TO AVOID**
STABLE	X	N/A

INCOMPATIBILITY (MATERIALS TO AVOID)
Acids

HAZARDOUS DECOMPOSITION PRODUCTS
Ammonia fumes

HAZARDOUS POLYMERIZATION		**CONDITIONS TO AVOID**
MAY OCCUR		N/A
WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Ventilate area. Flush spilled material to drain with large amounts of cold water.

WASTE DISPOSAL METHOD
Neutralize to pH 6 to 8 with dilute acid and discard. Contains ammonium salts. Consult local, state, or federal regulations for proper disposal.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE)
NIOSH approved respirator for ammonia.

VENTILATION	**LOCAL EXHAUST** X	**SPECIAL** N/A
	MECHANICAL (GENERAL) N/A	**OTHER** N/A

PROTECTIVE GLOVES Rubber	**EYE PROTECTION** Face shield/goggles

OTHER PROTECTIVE EQUIPMENT
Rubber apron

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Keep in tightly closed containers in a cool location. Store in ventilated area.

OTHER PRECAUTIONS
None

PREPARED BY: MacDermid Incorporated **DATE:** 4/30/87

19120

U. S. DEPARTMENT OF LABOR

WAGE AND LABOR STANDARDS ADMINISTRATION

Bureau of Labor Standards

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME: MACDERMID, INC.	EMERGENCY TELEPHONE NO.: 203-754-6161
ADDRESS (Number, Street, City, State, and ZIP Code): 526 HUNTINGDON AVENUE, WATERBURY, CONNECTICUT 06720	
CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS: Metex Etchant MU-A
CHEMICAL FAMILY	FORMULA

SECTION II HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS N.A.			BASE METAL N.A.		
CATALYST "			ALLOYS "		
VEHICLE "			METALLIC COATINGS "		
SOLVENTS "			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES "			OTHERS "		
OTHERS "					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Ammonium hydroxide	40	100ppm

SECTION III PHYSICAL DATA

BOILING POINT (°F.)		SPECIFIC GRAVITY (H_2O=1)	1.065
VAPOR PRESSURE (mm Hg.)		PERCENT VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR=1)		EVAPORATION RATE (_____ =1)	
SOLUBILITY IN WATER			
APPEARANCE AND ODOR	Water white liquid with ammonia odor.		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	Lel -	Uel
EXTINGUISHING MEDIA			
SPECIAL FIRE FIGHTING PROCEDURES			
UNUSUAL FIRE AND EXPLOSION HAZARDS	When heated will emit toxic fumes of ammonia.		

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE	Not known. See section II
EFFECTS OF OVEREXPOSURE	Can cuase irritation of eyes, skin, mucous membrane.
EMERGENCY AND FIRST AID PROCEDURES	Eyes - Flush with water for 15 minutes. Contact doctor.
	Skin - Flush with water.
	Internal - As for ammonia.

SECTION VI REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	

INCOMPATABILITY (Materials to avoid): Acids

HAZARDOUS DECOMPOSITION PRODUCTS: Toxic ammonia fumes

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR		

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Flush with water to drain.

WASTE DISPOSAL METHOD: Neutralize and discard.

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type): Respirator suitable for ammonia

VENTILATION	LOCAL EXHAUST	SPECIAL
	MECHANICAL (General) X	OTHER

PROTECTIVE GLOVES: Rubber	EYE PROTECTION: Face shield

OTHER PROTECTIVE EQUIPMENT: Rubber apron

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Keep away from heat and direct sunlifht.

Store in ventilated area.

OTHER PRECAUTIONS

MATERIAL SAFETY DATA SHEET

(R) 4/30/87

CODE 19121

SECTION 1

Manufacture's Name MacDermid Incorporated	EMERGENCY TELEPHONE 203-575-5700
ADDRESS (Number, Street, City, State, Zip Code) 526 Huntingdon Avenue Waterbury, CT. 06720	MFSA EMERGENCY 24 HOUR HOTLINE: (313) - 644 - 5626
CFR-49 - DOT Proper Shipping Name Sodium Chlorite Solution, (less than 42%) Corrosive Material UN1908	
CHEMICAL NAME AND SYNONYMS N/A	TRADE NAME AND SYNONYMS Metex Etchant MU-B
CHEMICAL FAMILY Oxidizing Agent	FORMULA Mixture

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVE & SOLVENTS	%	TLV (UNITS)	ALLOYS & METALLIC COATINGS	%	TLV (UNITS)
	N/A			N/A	
PIGMENTS	"		BASE METAL	"	
CATALYST	"		ALLOYS	"	
VEHICLE	"		METALLIC COATINGS	"	
SOLVENTS	"		FILLER METAL PLUS OR CORE FLUX	"	
ADDITIVES	"		OTHERS	"	
OTHERS	"				

HAZARDOUS MIXTURES OR OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (UNITS)
Sodium Chlorite (7758-19-2)	10	Unknown

SECTION III - PHYSICAL DATA

BOILING POINT (F)	<212	SPECIFIC GRAVITY (H_2O = 1)	1.11
VAPOR PRESSURE (MM. HG.)	Aqueous	PERCENT VOLATILE BY VOLUME (%)	N/A
VAPOR DENSITY (AIR = 1)	N/A	EVAPORATION RATE (= 1)	N/A
SOLUBILITY IN WATER	Complete		

APPEARANCE AND ODOR
Yellow solution - slight chlorine odor.

SECTION IV = FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) Non flammable	FLAMMABLE LIMITS N/A	~~LEL~~	~~UEL~~
EXTINGUISHING MEDIA Waterspray, CO_2, dry chemical			
SPECIAL FIRE FIGHTING PROCEDURES Supplies oxygen to fire, smothering techniques may be ineffective.			
UNUSUAL FIRE AND EXPLOSION HAZARDS Emits oxygen when heated. If heated to excess, can give off chlorine fumes. If heated to dryness, can explode.			

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
Not established for product. See Section II.

EFFECTS OF OVEREXPOSURE-UNLESS OTHERWISE STATED, CHRONIC OR LONG-TERM HEALTH EFFECTS UNKNOWN!
Will irritate eyes, skin and mucous membranes. No systemic health effects are associated with this product.

EMERGENCY AND FIRST AID PROCEDURES
Eyes: Flush with water for 15 minutes. Contact physician.
Skin: Flush with water.
Internal: Give water, do not induce vomiting. Contact physician.
Inhalation: Remove to fresh air.

SECTION VI - REACTIVITY DATA

UNSTABLE		**CONDITIONS TO AVOID**
STABLE	X	Do not heat or dry on combustibles.

INCOMPATIBILITY (MATERIALS TO AVOID)
Combustibles, organics, reducing agents, acids.

HAZARDOUS DECOMPOSITION PRODUCTS
Oxygen gas, chlorine

HAZARDOUS POLYMERIZATION		**CONDITIONS TO AVOID**
MAY OCCUR		N/A
WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Flush with water to drain. Do not let any spilled material dry on clothing. It can ignite the clothing. Remove clothing and wash with water at once.

WASTE DISPOSAL METHOD
Dilute with water and discard to sewer. Check local disposal regulations first.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE)
NIOSH approved fume mask for chlorine.

VENTILATION	**LOCAL EXHAUST** N/A	**SPECIAL** N/A
	MECHANICAL (GENERAL) X	**OTHER** N/A

PROTECTIVE GLOVES Rubber	**EYE PROTECTION** Face shield/safety glasses.

OTHER PROTECTIVE EQUIPMENT
Rubber apron

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Store in ventilated, cool area. Keep away from combustibles. Store in tightly closed containers.

OTHER PRECAUTIONS
If material comes in contact with acid, toxic fumes will be given off.

PREPARED BY: MacDermid Incorporated **DATE:** 4/30/87
19121

U. S. DEPARTMENT OF LABOR

WAGE AND LABOR STANDARDS ADMINISTRATION

Bureau of Labor Standards

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME	EMERGENCY TELEPHONE NO.
MACDERMID, INC.	203-754-6161
ADDRESS (Number, Street, City, State, and ZIP Code) 526 HUNTINGDON AVENUE, WATERBURY, CONNECTICUT 06720	
CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS: Metex Etchant MU- B
CHEMICAL FAMILY	FORMULA

SECTION II HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS N.A.			BASE METAL N.A.		
CATALYST "			ALLOYS "		
VEHICLE "			METALLIC COATINGS "		
SOLVENTS "			FILLER METAL " PLUS COATING OR CORE FLUX		
ADDITIVES "			OTHERS "		
OTHERS "					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Inorganic Chlorite compound	10	

SECTION III PHYSICAL DATA

BOILING POINT (°F.)		SPECIFIC GRAVITY (H_2O=1)	1.104
VAPOR PRESSURE (mm Hg.)		PERCENT VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR=1)		EVAPORATION RATE (_____ =1)	
SOLUBILITY IN WATER			
APPEARANCE AND ODOR	Yellow solution - slight chlorine odor.		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	Lel	Uel
N.A.			
EXTINGUISHING MEDIA N.A.			
SPECIAL FIRE FIGHTING PROCEDURES			
UNUSUAL FIRE AND EXPLOSION HAZARDS Can emit oxygen gas when heated. If heated to excess can emit toxic chloride fumes. If heated to dryness can explode.			

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: Not known

EFFECTS OF OVEREXPOSURE: Vapors may be irritating to mucous membrane.

EMERGENCY AND FIRST AID PROCEDURES: Eyes - Flush with water for 15 minutes. Contact doctor. Skin - Flush with water. Internal - As for chlorites.

SECTION VI REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	Do not heat.

INCOMPATABILITY (Materials to avoid): Do not mix with organics, combustibles, reducing agents or acids.

HAZARDOUS DECOMPOSITION PRODUCTS: Oxygen gas, oxides of chlorine

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Flush with water to drain.

WASTE DISPOSAL METHOD: Dilute with water and discharge to sewer.

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type): Fume mask suitable for chlorine

VENTILATION	LOCAL EXHAUST		SPECIAL
	MECHANICAL (General)	X	OTHER

PROTECTIVE GLOVES: Rubber	EYE PROTECTION: Safety glasses

OTHER PROTECTIVE EQUIPMENT: Rubber apron.

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store in ventilated, cool area. Keep away from combustibles.

OTHER PRECAUTIONS: If any material is spilled on clothing wash immediately with water. Dried material can ignite clothing.

7568

MAGNESIUM NITRATE, HEXAHYDRATE
MAGNESIUM NITRATE, HEXAHYDRATE
MAGNESIUM NITRATE, HEXAHYDRATE

NOV 1986

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY CONTACTS
GASTON L. PILLORI
(201) 796-7100

DATE: 10/23/86
PO NBR: N/A
ACCT: 001264-05
INDEX: 04-8629-40579
CAT NO: M46500

SUBSTANCE IDENTIFICATION

CAS-NUMBER 10213-15-7

SUBSTANCE: **MAGNESIUM NITRATE, HEXAHYDRATE**

TRADE NAMES/SYNONYMS: MAGNESIUM(II) NITRATE; NITRIC ACID, MAGNESIUM SALT; M-46

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: MG-N2-O6 .6H2O MOL WT: 256.45

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=0 REACTIVITY=0 PERSISTENCE=3

COMPONENTS AND CONTAMINANTS

PERCENT: 100 COMPONENT: MAGNESIUM NITRATE, HEXAHYDRATE

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
NONE ESTABLISHED.

PHYSICAL DATA

DESCRIPTION: COLORLESS, ODORLESS CRYSTALS. BOILING POINT: 626 F (330 C)

MELTING POINT: 203 F (95 C) SPECIFIC GRAVITY: 1.5

SOLUBILITY IN WATER: SOLUBLE SOLVENT SOLUBILITY: ALCOHOL

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
SLIGHT FIRE/MODERATE EXPLOSION HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPOR-AIR MIXTURES ARE EXPLOSIVE.

IN CONTACT WITH EASILY OXIDIZABLE SUBSTANCES, IT MAY REACT RAPIDLY ENOUGH TO CAUSE IGNITION, VIOLENT COMBUSTION OR EXPLOSION, INCREASING THE FLAMMABILITY OF ANY COMBUSTIBLE SUBSTANCE.

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE OR WATER SPRAY
(1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL FOAM
(1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FIREFIGHTING:
MOVE CONTAINERS FROM FIRE AREA IF POSSIBLE. COOL CONTAINERS EXPOSED TO FLAMES WITH WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT. FOR MASSIVE FIRE IN STORAGE AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; ELSE WITHDRAW FROM AREA AND LET FIRE BURN (1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FLOOD WITH WATER. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING VAPORS OR DUSTS. EVACUATE TO A RADIUS OF 2500 FEET FOR UNCONTROLLABLE FIRES (BUREAU OF EXPLOSIVES, EMERGENCY HANDLING OF HAZARDOUS MATERIALS IN SURFACE TRANSPORTATION, 1981).

TOXICITY

5400 MG/KG ORAL-RAT LD50; CARCINOGEN STATUS: NONE.
MAGNESIUM NITRATE MAY BE ABSORBED INTO THE BODY BY INHALATION AND INGESTION. IT IRRITATES THE EYES, SKIN AND MUCOUS MEMBRANES. PROLONGED EXPOSURE MAY CAUSE FORMATION OF METHEMOGLOBINEMIAS.

HEALTH EFFECTS AND FIRST AID

INHALATION:
IRRITANT.
ACUTE EXPOSURE- COUGHING, SHORTNESS OF BREATH, WATERY OR BLOODY DIARRHEA, CYANOSIS AND FORMATION OF METHEMOGLOBINEMIA IN THE BLOOD.

CHRONIC EXPOSURE- NONE REPORTED.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. KEEP AFFECIED PERSON WARM AND AT REST. GET MEDICAL ATTENTION.

SKIN CONTACT:
IRRITANT.
ACUTE EXPOSUE- REDNESS, PAIN AND IRRITATION TO SKIN.

CHRONIC EXPOSURE- NONE REPORTED.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER (APPROXIMATELY 15-20 MINUTES) UNTIL NO EVIDENCE OF CHEMICAL REMAINS. GET MEDICAL ATTENTION.

EYE CONTACT:
IRRITANT.
ACUTE EXPOSURE- REDNESS AND PAIN.

CHRONIC EXPOSURE- NONE REPORTED.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION.

INGESTION:
IRRITANT.
ACUTE EXPOSURE- ABDOMINAL PAINS AND SPASMS, FAINTNESS, MUSCULAR SPASMS, CYANOSIS, VOMITING, WATERY OR BLOODY DIARRHEA, UNCONSCIOUSNESS AND FORMATION OF METHEMOGLOBIN WITHIN THE BLOOD.

FIRST AID- IF VICTIM IS CONSCIOUS, IMMEDIATELY GIVE 2 TO 4 GLASSES OF WATER, AND INDUCE VOMITING BY TOUCHING FINGER TO BACK OF THROAT. GET MEDICAL ATTENTION IMMEDIATELY.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

WHEN HEATED GIVES OFF OXYGEN, INCREASING THE FIRE HAZARD. STRONG OXIDANT WHICH REACTS VIOLENTLY WITH COMBUSTIBLE AND REDUCING MATERIALS, CAUSING FIRE AND EXPLOSION HAZARDS. MAY ALSO REACT WITH STRONG ACIDS, GIVING OFF TOXIC FUMES.

INCOMPATIBILITIES:
REACTS WITH DIMETHYL FORMAMIDE, CAUSING FIRE AND EXPLOSION HAZARD. REACTS WITH STRONG ACIDS GIVING OFF TOXIC AND CORROSIVE NITRIC ACID AND SOMETIMES NITROGEN TETROXIDES. MIXTURES OF THE NITRATE WITH THE POWDERED METALS OR OXIDES ARE REPORTED TO BE EXPLOSIVE. SUBSTANCE IS A STRONG OXIDIZER AND REACTS VIOLENTLY WITH COMBUSTABLES AND REDUCING AGENTS.

DECOMPOSITION:
UPON HEATING (ABOVE 330 C), FORMS TOXIC AND CORROSIVE OXIDES OF NITROGEN WHICH OXIDIZE THE METAL SO EXOTHERMICALLY THAT IGNITION OCCURS. SPONTANEOUS DECOMPOSITION OCCURS IN PRESENCE OF DIMETHYLFORMAMIDE.

POLYMERIZATION:
NONE KNOWN.

****

CONDITIONS TO AVOID

MAY IGNITE OTHER COMBUSTIBLE MATERIALS (WOOD, PAPER, OIL, ETC.). REACTION WITH FUELS MAY BE VIOLENT. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

CONSULT NFPA PUBLICATION 43A, STORAGE OF LIQUID AND SOLID OXIDIZING MATERIALS, FOR STORAGE REQUIREMENTS.

****

SPILL AND LEAK PROCEDURES

SOIL SPILL:
DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

WATER SPILL:
NEUTRALIZE WITH CAUSTIC SODA.

ADD CALCIUM HYPOCHLORITE TO SPILL.

ADD SUITABLE AGENT TO NEUTRALIZE SPILLED MATERIAL TO PH-7.

OCCUPATIONAL SPILL:
KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC) AWAY FROM SPILLED MATERIAL. DO NOT TOUCH SPILLED MATERIAL. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND, EARTH OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:
NOT APPLICABLE.

RESPIRATOR:
HIGH LEVELS- GAS MASK WITH AN ORGANIC VAPOR CANISTER (CHIN-STYLE OR FRONT- OR BACK-MOUNTED CANISTER).
SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE, HELMET, OR HOOD.
SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.

ESCAPE- GAS MASK WITH AN ORGANIC VAPOR CANISTER (CHIN-STYLE OR FRONT- OR BACK-MOUNTED CANISTER).
SELF-CONTAINED BREATHING APPARATUS.

FIREFIGHTING- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

AUTHORIZED - ALLIED FISHER SCIENTIFIC
CREATION DATE: 01/11/85 REVISION DATE: 09/05/85

-ADDITIONAL INFORMATION-

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MAGNESIUM SULFATE

APR 1987

MAGNESIUM SULFATE
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MAGNESIUM SULFATE

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY CONTACTS
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(201) 796-7100

DATE: 06/25/86
PO NBR: N/A
ACCT: 001264-04
INDEX: 04-8617-10679
CAT NO: M63500

SUBSTANCE IDENTIFICATION

CAS-NUMBER 7487-88-9

SUBSTANCE: MAGNESIUM SULFATE

TRADE NAMES/SYNONYMS: MAGNESIUM SULFATE (1:1); EPSOM SALTS; MAGNESIUM SULPHATE; SULFURIC ACID MAGNESIUM SALT (1:1); SULFURIC ACID, MAGNESIUM SALT; MAGNESIUM SULFATE, HEPTAHYDRATE; M-63; M-64; M-65; M-67

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: O4-S-MG MOL WT: 120.37

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=0 REACTIVITY=0 PERSISTENCE=3

COMPONENTS AND CONTAMINANTS

PERCENT: 100 COMPONENT: MAGNESIUM SULFATE

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
NONE ESTABLISHED

PHYSICAL DATA

DESCRIPTION: OPAQUE NEEDLES, COLORLESS CRYSTALS, SALINE BITTER TASTE

BOILING POINT: 200 C LOSES 7 H2O MELTING POINT: 150 C LOSES 6 H2O

SPECIFIC GRAVITY: 2.7 PH: 6-7 SOLUBILITY IN WATER: 26% @ 0 C ANHYDROUS

SOLVENT SOLUBILITY: GLYCEROL, ALCOHOL

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLIGIBLE FIRE AND NEGLIGIBLE EXPLOSION HAZARD IN DUST FORM WHEN EXPOSED TO HEAT OR FLAME.

FLASH POINT: NON-APPLICABLE

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR FOAM (1984 EMLRGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL FOAM (1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FIREFIGHTING:
NO ACUTE HAZARD. MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. AVOID BREATHING VAPORS OR DUSTS; KEEP UPWIND.

TOXICITY

1750 MG/KG SUBCUTANEOUS-RABBIT LDLO; 5000 MG/KG ORAL-MOUSE LDLO; 3000 MG/KG ORAL RABBIT LDLO; 980 MG/KG SUBCUTANEOUS-MOUSE LD50; 1200 MG/KG INTRAPERITONEAL DOG LDLO; 1500 MG/KG SUBCUTANEOUS-DOG LDLO; 1000 MG/KG SUBCUTANEOUS-CAT LDLO; 1800 MG/KG SUBCUTANEOUS-GUINEA PIG LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); CARCINOGEN STATUS: NONE.

MAGNESIUM SULFATE MAY BE ABSORBED INTO THE BODY BY INHALATION AND INGESTION. THE PRINCIPAL MANIFESTATIONS OF ACUTE POISONING ARE WATERY DIARRHEA AND RESPIRATORY FAILURE.

HEALTH EFFECTS AND FIRST AID

INHALATION:
IRRITANT.

ACUTE EXPOSURE- IF LARGE AMOUNTS OF DUST OR MIST ARE BREATHED, SYSTEMIC MAGNESIUM POISONOING MAY OCCUR, MANIFESTED BY PURGING, COLLAPSE, HYPOTENSION, VOMITING, DIARRHEA (WATERY OR BLOODY) PALLOR, RAPID HEART RATE COMA AND DEATH. LESSER EXPOSURE MAY CAUSE IRRITATION OF THE RESPITORY TRACT.

CHRONIC EXPOSURE- NONE REPORTED IN HUMANS , HOWEVER, SEE MUTAGENIC AND REPRODUCTIVE REFERENCES (TO ANIMAL STUDIES) IN THE TOXICITY SECTION.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP AFFECTED PERSON WARM AND AT REST. GET MEDICAL ATTENTION.

SKIN CONTACT:
IRRITANT.

ACUTE EXPOSURE- DIRECT CONTACT MAY RESULT IN IRRITATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY RESULT IN DERMATITIS.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION.

EYE CONTACT:
IRRITANT.
ACUTE EXPOSURE- PARTICULATES IN THE EYE MAY CAUSE IRRITATION, LACRIMATION, AND CONJUNCTIVITIS.

CHRONIC EXPOSURE- CONJUNCTIVITIS MAY OCCUR.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING THE UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 10-20 MINUTES). GET MEDICAL ATTENTION.

INGESTION:
IRRITANT.
ACUTE EXPOSURE- INGESTION OF A LARGE QUANTITY OF CONCENTRATED SOLUTION OF MAGNESIUM SULFATE WILL CAUSE GASTROINTESTINAL IRRITATION, VOMITING, ABDOMINAL PAIN, WATERY OR BLOODY DIARRHEA, TENESMUS AND COLLAPSE. SYMPTOMS OF RESTLESSNESS, FLUSHING, AND HYPOTENSION BEGIN AT SERUM MAGNESIUM LEVELS OF 4 MEQ/L AND PROGRESS TO COMA, FLACCID PARALYSIS, AND FAILURE OF RESPIRATION AT SERUM MAGNESIUM LEVELS OF 13-15 MEQ/L. THIS CAN BE FATAL.

FIRST AID- IF VICTIM IS CONSCIOUS, IMMEDIATELY GIVE 2 TO 4 GLASSES OF WATER, AND INDUCE VOMITING BY TOUCHING FINGER TO BACK OF THROAT. GET MEDICAL ATTENTION IMMEDIATELY.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL AND PRESSURES, AT LEAST UP TO THE MELTING POINT OF HEPTAHYDRATE, 150 C. HOWEVER, NOTE LOSS OF WATER OF CRYSTALLIZATION, SEE PHYSICAL PROPERTIES.

INCOMPATIBILITIES:
VIGOROUS DECOMPOSITION OR VIOLENT EXPLOSIONS HAVE BEEN OBSERVED ON SEVERAL OCCASIONS DURING CARELESS HANDLING (USUALLY OVERHEATING) OF ETHOXYETHYNYL ALCOHOLS. THE EXPLOSIONS NOTED WHEN MAGNESIUM SULFATE WAS USED TO DRY THEIR ETHEREAL SOLUTONS WERE ATTRIBUTED TO THE SLIGHT ACIDITY OF THE SALT CAUSING EXOTHERMIC REARRANGEMENT OF THE ALCOHOLS TO ACRYLIC ESTERS AND SUBSEQUENT EXPLOSIVE REACTIONS.
ALUMINUM, PARTICULARLY IN A FINELY DIVIDED STAE OR IF HEATED, REACTS VIGOROUSLY WITH SULFATES, POSSIBLE EXPLOSIVELY.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS INCLUDE HIGHLY TOXIC FUMES OF SULFUR OXIDES.

POLYMERIZATION:
WILL NOT OCCUR.

****

CONDITIONS TO AVOID

HEATING TO THE VICINITY OF THE MELTING POINT, 1124 C.
CONTACT WITH OR STORAGE WITH ETHOXYETHYNYL ALCOHOLS.

****

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
PROVIDE VENTILATION. SWEEP UP WITH A MINIMUM OF DUSTING AND COLLECT IN A SUITABLE, E.G. FIBERBOARD CONTAINER. KEEP OUT OF SEWERS AND WATER SOURCES.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION SYSTEM.

RESPIRATOR:
HIGH LEVELS- HIGH-EFFICIENCY PARTICULATE RESPIRATOR WITH A FULL FACE-PIECE.

FIREFIGHTING- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES AS NECESSARY TO AVOID REPEATED OR PROLONGED CONTACT WITH DUST, MIST, OR SOLUTION. PREFERRED MATERIAL: CHLORINATED POLYETHYLENE, BASED ON LIMITED DATA.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES.

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHALL PROVIDE AN EYE-WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.
DO NO WEAR CONTACT LENSES WHEN WORKING WITH CHEMICALS.

AUTHORIZED - ALLIED FISHER SCIENTIFIC
CREATION DATE: 02/27/85 REVISION DATE: 08/14/85

-ADDITIONAL INFORMATION-

========== MATERIAL SAFETY DATA SHEET ==========

MSDS ID # ******100440

Original issue date: 04/07/87 Revised: 04/07/87 Prepared by: GBD CAS Number: NA

1. IDENTIFICATION

Product Name: MATH-A-MAGIC HAND CLEANER (b) I0179-900
Other (c) NA (d) NA

Label: NA
DOT Instructions: NA
NA

2.INGREDIENTS AND HAZARDS

	Ingredients	%	CAS NO.	PEL	TLV	HAZARD DATA
a.	TRIETHANOLAMINE	10.0	102-71-6	NA	NE 74	Eye hazard
b.						
c.						
d.						
e.						
f.						
g.						
h.						
i.						

AS COMPOUND: TLV: NE (ACUTE ORAL LD50 = 11.7 GM/KG MALE MICE)

3. PHYSICAL DATA

Boiling Point (F) NA (C) NA Vap. Pres.(mm Hg) NA Spec. Grav. (H2O=1) 1.24 Evap. Rate(BUTYL ACETATE=1) NA
Freezing Point(F) NA (C) NA Vap. Dens.(AIR =1) NA Volitale by Vol. NA % Soluble in water? YES
* * *
Appearance and Odor: Off white/yellowish, somewhat granular paste, slightly perfumed

4. FIRE AND EXPLOSION HAZARD DATA LEL UEL

Flash Point (method used) NA Flammable Limits NA % NA % Auto-ignition Temp. NA
Extinguishing Med. 1108 SMALL FIRES: Dry chemcial, sand, water spray or foam.
LARGE FIRES: Water spray, fog or foam.
Special Procedure 2074 NA
or
Unusual Hazard 3030 NA

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The information contained herein is based upon what we believe to be reliable data. However, we make no warranty or guarantee, express or implied, concerning the accuracy of such information and disclaim all liability from reliance thereon. You should evaluate the information through your own sources prior to use.

Matthews Int Corp. 6515 Penn Ave
Pittsburgh PA 15206 412 665-2500

5. HEALTH HAZARD DATA

Overexposure 5217 None expected
) Symptoms
and
Effects

Primary routes 6113 Eye contact
of entry

EMERGENCY & 7001 EYE CONTACT; immediately flush with water for 15 minutes including under the eyelids. Get medical help.
FIRST AID 7026 INGESTION: Do not induce vomiting, get medical help.
PROCEDURES

AGGRAVATED NA
MEDICAL
CONDITIONS

6. REACTIVITY DATA
Stable ? YES Conditions to avoid NA
Incompatability Oxidizing agents
(Material to avoid) NA

Hazardous Decompo- NA
)tion Products

Hazardous Polymerization may occur NO Condition to avoid NA

7. SPILL OR LEAK PROCEDURES CHEMTREC TELEPHONE # 800-424-9300 COAST GUARD TELEPHONE # 800-424-8802
Steps in case NA

Materials NA
released

Waste disposal 9011 Bury in an approved landfill, or burn in an approved incinerator with scrubber, followed by bury-
method ing the residues in an approved landfill. Handle in accordance with Federal, State, and local regulations.

8. SPECIAL PROTECTION INFORMATION
Respiratory: NA
Gloves: NA Eye and Face: NA
Other Protective Equipment: NA
Ventilation: NA

9. SPECIAL PRECAUTIONS
Handling and NA
storage

Other Do not ingest. Avoid contact with eyes.
precautions

METHANOL OCT 1986

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MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
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SUBSTANCE IDENTIFICATION

CAS-NUMBER 67-56-1

SUBSTANCE: [redacted]

TRADE NAMES/SYNONYMS: METHYL ALCOHOL; WOOD ALCOHOL; METHYL HYDROXIDE; CARBINOL; MONOHYDROXYMETHANE; WOOD SPIRIT; WOOD NAPHTHA; U154; UN 1230;

CHEMICAL FAMILY:
HYDROXYL, ALIPHATIC

MOLECULAR FORMULA: C-H4-O MOL WT: 32.04

CERCLA RATINGS (SCALE 0-3): HEALTH=1 FIRE=3 REACTIVITY=0 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

PERCENT: 100 COMPONENT: METHYL ALCOHOL

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
200 PPM OSHA TWA
200 PPM NIOSH RECOMMENDED TWA
200 PPM ACGIH TWA (SKIN); 250 PPM ACGIH STEL

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS LIQUID; CHARACTERISTIC ALCOHOL ODOR.

BOILING POINT: 147 F (64 C) MELTING POINT: -144 F (-98 C)

SPECIFIC GRAVITY: 0.8 VAPOR PRESSURE: 97 MMHG @ 20 C

EVAPORATION RATE: (ETHER=1) 5.9 (TTE) SOLUBILITY IN WATER: SOLUBLE

ENT SOLUBILITY: ETHER, BENZENE, ALCOHOL, KETONES, ORG SOLVENTS

ODOR THRESHOLD: 100 PPM VAPOR DENSITY: 1.1

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE/NEGLIGIBLE EXPLOSION HAZARD WHEN EXPOSED TO HEAT OR FLAME.
FIRE AND EXPLOSION HAZARD BY REACTION WITH STRONG OXIDIZERS.
VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.
VAPOR-AIR MIXTURES ARE EXPLOSIVE.

FLASH POINT: 52 F (11 C) (CC) UPPER EXPLOSION LIMIT: 36.5%

LOWER EXPLOSION LIMIT: 6.0% AUTOIGNITION TEMP.: 725 F (385 C)

FLAMMABILITY CLASS(OSHA): IB

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR FOAM
(1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FOR LARGER FIRES, USE WATER SPRAY OR FOAM: FOAM IS PREFERRABLE.

FIREFIGHTING:
FLAMMABLE LIQUID (POISONOUS)- WEAR RESPIRATORY EQUIPMENT. DO NOT ATTEMPT TO EXTINGUISH FIRE UNLESS SPILL FLOW CAN BE STOPPED. USE FLOODING QUANTITIES OF WATER AS A FOG AND TO COOL ALL CONTAINERS INVOLVED IN FIRE. APPLY WATER FROM AS FAR A DISTANCE AS POSSIBLE. APPLICATION OF SOLID STREAMS OF WATER MAY SPREAD FIRE.

TOXICITY

5 PPM EYE-HUMAN IRRITATION; 500 MG/24 HOURS SKIN-RABBIT MODERATE IRRITATION; 40 MG EYE-RABBIT MODERATE IRRITATION; 340 MG/KG ORAL-HUMAN LDLO; 868 MG/KG UNKNOWN-HUMAN LDLO; 5628 MG/KG ORAL-RAT LD50; 64,000 PPM/4 HOURS INHALATION-RAT LC50; 1000 PPM INHALATION-MONKEY LCLO; 500 MG/KG SKIN-MONKEY LDLO; 20 GM/KG SKIN-RABBIT LD50; 8600 MG/M3 INHALATION-HUMAN TCLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); CARCINOGEN STATUS: NONE.

METHYL ALCOHOL IS A EYE, SKIN, AND MUCOUS MEMBRANE IRRITANT AND A CENTRAL NERVOUS SYSTEM DEPRESSANT.

HEALTH EFFECTS AND FIRST AID

INHALATION:
NARCOTIC. 25,000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.
ACUTE EXPOSURE- INTOXICATION BEGINS WITH A STATE OF INEBRIATION. WITHIN 12-18 HOURS, HEADACHE, ANOREXIA, WEAKNESS, FATIGUE, LEG CRAMPS, VERTIGO AND RESTLESSNESS OCCUR, FOLLOWED BY NAUSEA, VOMITING, DIARRHEA, DIZZINESS, AND OTHER SIGNS OF NARCOSIS, THEN SEVERE ABDOMINAL, BACK AND LEG PAIN, MUSCULAR INCOORDINATION, SWEATING, TRACHEITIS AND BRONCHITIS. APATHY OR DELIRIUM MAY PROGRESS TO COMA. EXCITEMENT, MANIA AND CONVULSIONS OCCUR

RARELY. BLURRED OR DIMMED VISION HAS OCCURRED WITH OPTIC NEURITIS, EYE PAIN AND ATROPHY, CONCENTRIC VISUAL FIELDS AND PHOTOPHOBIA, FOLLOWED BY TRANSIENT OR PERMANENT BLINDNESS. ACIDOSIS MAY RESULT IN RAPID, SHALLOW RESPIRATION, CYANOSIS, COMA AND HYPOTENSTION. MILD TACHYCARDIA, CARDIAC DEPRESSION AND PERIPHERAL NEURITIS ARE POSSIBLE AS WELL AS LIVER AND KIDNEY DAMAGE AND CEREBRAL FAILURE OR CIRCULATORY COLLAPSE. PROLONGED ASTHENIA AND PARTIAL OR COMPLETE LOSS OF VISION IN 2-6 DAYS, AND PERMANENT RENAL DYSFUNCTION MAY FOLLOW NON-FATAL INTOXICATION. BLINDNESS IS CAUSED AT 800 TO 1000 PPM. 50,000 PPM WILL PROBABLY CAUSE DEATH IN 1 TO 2 HOURS.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE MAY CAUSE SYMPTOMS SUCH AS BLURRED VISION, CONTRACTION OF VISUAL FIELDS AND SOMETIMES, COMPLETE BLINDNESS. SEE MUTAGENIC DATA AND ANIMAL REPRODUCTIVE EFFECTS DATA REFERENCES IN TOXICITY SECTION.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP AFFECTED PERSON WARM AND AT REST. GET MEDICAL ATTENTION.

SKIN CONTACT:
IRRITANT/NARCOTIC.

ACUTE EXPOSURE- CONTACT WITH LIQUID CAN PRODUCE DEFATTING AND A MILD DERMATITIS. READILY ABSORBED THROUGH INTACT SKIN TO CAUSE NARCOSIS, OPTIC NEURITIS AND ACIDOSIS.

CHRONIC EXPOSURE- PROLONGED OR REPEATED SKIN CONTACT PRODUCES ECZEMA, REDNESS AND SCALING. CHRONIC ABSORPTION MAY RESULT IN VISUAL IMPAIRMENT AND OPTIC NEURITIS. SEE MUTAGENIC DATA AND ANIMAL REPRODUCTIVE EFFECTS DATA REFERENCES IN TOXICITY SECTION.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
IRRITANT.

ACUTE EXPOSURE- EYE CONTACT WITH METHANOL HAS CAUSED SUPERFICIAL CORNEAL LESIONS. INGESTION, INHALATION OR SKIN ABSORPTION MAY RESULT IN BLURRED OR DIMMED VISION FOLLOWED BY TRANSIENT OR PERMANENT BLINDNESS, WITH OPTIC NEURITIS, EYE PAIN, ATROPHY, CONCENTRIC VISUAL FIELDS AND PHOTOPHOBIA. 5 PPM AND 40 MG CAUSE MODERATE IRRITATION IN EYES OF HUMANS AND RABBITS RESPECTIVELY.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE CONJUNCTIVITIS. VISUAL IMPAIRMENT AS DESCRIBED ABOVE MAY INDICATE CHRONIC EXPOSURE BY INGESTION, INHALATION OR SKIN ABSORPTION.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
NARCOTIC.

ACUTE EXPOSURE- MAY CAUSE DELAYED SYMPTOMS OF HEADACHE, ANOREXIA, WEAKNESS, FATIGUE, LEG CRAMPS, VERTIGO AND RESTLESSNESS, FOLLOWED BY NAUSEA, VOMITING, DIARRHEA, DIZZINESS, AND OTHER SIGNS OF NARCOSIS. SEVERE ABDOMINAL,

BACK AND LEG PAIN, MUSCULAR INCOORDINATION, SWEATING, TRACHEITIS AND BRONCHITIS MAY OCCUR. APATHY OR DELIRIUM MAY PROGRESS TO COMA. EXCITEMENT, MANIA AND CONVULSIONS HAVE OCCURRED RARELY. BLURRED OR DIMMED VISION FOLLOWED BY TRANSIENT OR PERMANENT BLINDNESS WITH OPTIC NEURITIS, EYE PAIN, ATROPHY, CONCENTRIC VISUAL FIELDS AND PHOTOPHOBIA MAY OCCUR. ACIDOSIS MAY RESULT IN RAPID, SHALLOW RESPIRATION, CYANOSIS, COMA AND HYPOTENSION. MILD TACHYCARDIA, CARDIAC DEPRESSION AND PERIPHERAL NEURITIS ARE POSSIBLE, AS WELL AS LIVER AND KIDNEY DAMAGE AND CEREBRAL AND PULMONARY EDEMA. DEATH IS POSSIBLE FROM RESPIRATORY FAILURE OR CIRCULATORY COLLAPSE. PROLONGED ASTHENIA AND PARTIAL OR COMPLETE LOSS OF VISION IN 2-6 DAYS, AND PERMANENT RENAL DYSFUNCTION MAY FOLLOW NON-FATAL INTOXICATION.

FIRST AID- GET MEDICAL ATTENTION IMMEDIATELY. IF MEDICAL ATTENTION IS NOT IMMEDIATELY AVAILABLE, AND IF VICTIM IS CONSCIOUS, ATTEMPT TO INDUCE VOMITING BY TOUCHING FINGER TO BACK OF THROAT. ALSO GIVE SODIUM BICARBONATE (BAKING SODA), 2 TEASPOONFULS IN WATER.

REACTIVITY

REACTIVITY:
STABLE AT ORDINARY PRESSURES UP THE BOILING POINT, 64 C.

INCOMPATIBILITIES:
OXIDIZERS AND OTHER MATERIALS, EXAMPLES FOLLOW:

METHANOL:
- CHLOROFORM AND SODIUM HYDROXIDE: EXPLOSIVE REACTION.
- CALCIUM CARBIDE: VIOLENT REACTION.
- MAGNESIUM: VIOLENT REACTION.
- CYANURIC CHLORIDE: VIOLENT REACTION.
- BERYLLIUM HYDRIDE: INTENSE REACTION AT 200 C.
- BROMINE: INTENSE EXOTHERMIC REACTION.
- CHROMIC ANHYDRIDE: POSSIBLE EXPLOSIVE REACTION.
- NICKEL: POSSIBLE IGNITION IN THE PRESENCE OF CATALYTIC AMOUNTS.

DECOMPOSITION:
COMBUSTION PRODUCTS INCLUDE TOXIC/HAZARDOUS GASES OF FORMALDEHYDE, CARBON MONOXIDE AND CARBON DIOXIDE.

POLYMERIZATION:
WILL NOT OCCUR.

****

CONDITIONS TO AVOID

MAY BE IGNITED BY HEAT, SPARKS OR FLAMES. CONTAINER MAY EXPLODE IN HEAT OF FIRE. VAPOR EXPLOSION AND POISON HAZARD INDOORS, OUTDOORS OR IN SEWERS. RUN-OFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

AVOID CONTACT WITH OR STORAGE WITH INCOMPATIBLE MATERIALS, INCLUDING THOSE LISTED IN THE REACTIVITY SECTION.

****

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
SHUT OFF IGNITION SOURCES. PROVIDE VENTILATION. WEAR RESPIRATORY PROTECTION. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER NON COMBUSTIBLE, ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL, CLOSE TIGHTLY AND LABEL 'FLAMMABLE'. FOR LARGER SPILLS, DIKE AS CLOSE TO SPILL AS PRACTICAL TO MINIMIZE ENVIRONMENTAL CONTAMINATION. NO SMOKING, FLAMES OR FLARES IN HAZARD ARES. KEEP OUT OF SEWERS AND WATER SOURCES.

WHEN MATERIAL IS INVOLVED IN FIRE:
DO NOT ATTEMPT TO EXTINGUISH FIRE UNLESS SPILL OR LEAK FLOW CAN BE STOPPED.
USE FLOODING QUANTITIES OF WATER AS A FOG.
APPLICATION OF SOLID STREAMS OF WATER MAY SPREAD FIRE.
USE FLOODING QUANTITIES OF WATER TO COOL ALL CONTAINERS INVOLVED IN FIRE.
APPLY WATER TO MATERIAL FROM AS FAR A DISTANCE AS POSSIBLE.
EXTINGUISH WITH DRY CHEMICAL, ALCOHOL FOAM OR CARBON DIOXIDE.
DO NOT ALLOW RUN-OFF WATER TO CONTAMINATE SEWERS OR WATER SOURCES.

WHEN MATERIAL NOT INVOLVED IN FIRE:
KEEP OPEN FLAMES, SPARKS OR OTHR IGNITION SOURCES AWAY.
DO NOT ALLOW MATERIAL TO CONTAMINATE SEWERS OR WATER SOURCES.
BUILD DIKES FOR CONTAINMENT OF SPILL FLOW.
STOP LEAK IF YOU CAN DO IT WITHOUT RISK.
KNOCK DOWN VAPORS WITH WATER SPRAY.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST VENTILATION OR GENERAL DILUTION VENTILATION TO MEET PERMISSIBLE EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

2000 PPM- SUPPLIED-AIR RESPIRATOR.
SELF-CONTAINED BREATHING APPARATUS.

10,000 PPM- SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE, HELMET, OR HOOD.
SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.

> 10,000 PPM, INCLUDING THE IDLH LEVEL, 25,000 PPM (2.5%)-
TYPE C SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE, HELMET, OR HOOD OPERATED IN POSITIVE PRESSURE MODE OR IN CONTINUOUS-FLOW MODE.

FIREFIGHTING- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR IMPERVIOUS CLOTHING AS NECESSARY TO AVOID ANY POSSIBILITY OF CONTACT WITH SOLUTIONS OR MISTS.

GLOVES:
WEAR PROTECTIVE GLOVES AS NECESSARY TO AVOID REPEATED OR PROLONGED CONTACT

TH SOLUTION OR MIST. PREFERRED MATERIALS: BUTYL, NEOPRENE AND NITRILE RUBBER GLOVES.

EYE PROTECTION:
WEAR FACESHIELD (8 INCH MINIMUM) OR SPLASH-PROOF SAFETY GOGGLES WHERE THERE IS REASONABLE PROBABILITY OF CONTACT WITH LIQUID OR MIST. DO NOT WEAR CONTACT LENSES WHEN WORKING WITH CHEMICALS.

AUTHORIZED - ALLIED FISHER SCIENTIFIC
CREATION DATE: 10/25/85 REVISION DATE: 11/14/85

-ADDITIONAL INFORMATION-

PHILIP A. HUNT CHEMICAL CORPORATION

5 GARRET MOUNTAIN PLAZA
WEST PATERSON, N.J. 07424
EMERGENCY TELEPHONE: 201-585-7100

PRODUCT SAFETY DATA SHEET

MATERIAL SAFETY DATA SHEET

3986

SECTION I - IDENTIFICATION

CHEMICAL NAME & SYNONYMS		
Methanol, Methyl Alcohol		
CHEMICAL FAMILY: Alcohol	FORMULA: CH_3OH	TRADE NAME: Methanol
DESCRIPTION: Water white liquid		CAS NO.: 67-56-1

SECTION II - NORMAL HANDLING PROCEDURES

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Do not get in eyes, on skin or on clothing. Do not take internally. Upon contact with skin or eyes, wash off with water. Avoid breathing mist or vapor. Store in a cool, dry, well-ventilated place away from all sources of ignition. Storage should be in a flammable material cabinet.

PROTECTIVE EQUIPMENT		VENTILATION REQUIREMENTS
Eyes	Goggles	As required to keep airborne concentrations below TLV.
Gloves	Impervious	
Other	Coveralls and impervious boots	

SECTION III - HAZARDOUS INGREDIENTS

BASIC MATERIAL	OSHA PEL	LD 50	LC 50	SIGNIFICANT EFFECTS
Methanol	200 ppm	13 g/kg (rat)	>50,000 ppm 1/hr(rat)	Skin, eye and mucous membrane irritation. Ingestion of small amounts is highly toxic (causes blindness)

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT METHOD	OSHA CLASSIFICATION	FLAMMABLE EXPLOSIVE LIMITS	LOWER	UPPER
52°F CC	Flammable liquid		6.0%	36.0%

EXTINGUISHING MEDIA Dry chemical, carbon dioxide, alcohol foam and water spray. Water should be used to cool fire exposed containers and to disperse unignited vapors.

SPECIAL FIRE HAZARD & FIRE FIGHTING PROCEDURES Use NIOSH/MSHA approved self-contained breathing apparatus where this material is involved in a fire.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
200 ppm TWA; 250 ppm STEL; (Skin) (ACGIH 1985)

SYMPTOMS OF OVER EXPOSURE Skin, eye and mucous membrane irritation. Headache, drowsiness, nausea, vomiting, blurred vision, blindness, dermatitis, unsteady gait. Ingestion of one-third to one-half an ounce can cause blindness.

EMERGENCY FIRST-AID PROCEDURES

SKIN	Flush with water for 15 minutes, call a physician.
EYES	Flush with water for 15 minutes, call a physician.
INGESTION	Drink water, induce vomiting by sticking finger down throat, call a physician.
INHALATION	Remove victim to fresh air, call a physician.

Chemical | Methanol | CAS No. | 67-56-1

PHILIP A. HUNT CHEMICAL CORPORATION

CHEMICAL NAME Methanol

SECTION VI - TOXICOLOGY (Product)

ACUTE ORAL LD 50	5.6 g/kg (rat)	CARCINOGENICITY	Not known to be carcinogenic
Ingestion is highly toxic in humans		MUTAGENICITY	Not known to be mutagenic
ACUTE DERMAL LD 50	20 g/kg (rabbit)	EYE IRRITATION	Irritant
		PRIMARY SKIN IRRITATION	Irritant
ACUTE INHALATION LC 50	Greater than 50,000 ppm/1 hour (rat)		

PRINCIPAL ROUTES OF ABSORPTION

Inhalation, skin contact

EFFECTS OF ACUTE EXPOSURE Eye and mucous membrane irritation, drowsiness, nausea, vomiting, blurred vision, blindness.

EFFECTS OF CHRONIC EXPOSURE

Dermatitis from repeated or prolonged contact to skin.

SECTION VII - SPILL AND LEAKAGE PROCEDURES (Control Procedures)

ACTION FOR MATERIAL RELEASE OR SPILL

Remove all sources of ignition. Wear NIOSH/MSHA approved self-contained breathing apparatus. Follow OSHA regulations for respirator use. (See 29 CFR 1910.134). Wear goggles, coveralls, impervious gloves and boots. Add non-combustible dry absorbent, shovel or sweep up. Place in an approved DOT container. Allow to stabilize before sealing. Wash all contaminated clothing before reuse.
In the event of a large spill use the Chemtrec emergency service (800) 424-9300.

TRANSPORTATION EMERGENCY, CONTACT CHEMTREC 800-424-9300

WASTE DISPOSAL METHOD

Dispose of contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Consult appropriate federal, state and local regulatory agencies to ascertain proper disposal procedures.

SECTION VIII - SHIPPING DATA

D.O.T. CLASS Methyl alcohol, Flammable liquid UN 1230

SECTION IX - REACTIVITY DATA

STABLE X UNSTABLE AT ____ °C ____ °F	HAZARDOUS POLYMERIZATION	MAY OCCUR	
		WILL NOT OCCUR	X

CONDITIONS TO AVOID Ignition sources of any kind, high heat

INCOMPATIBILITY (Material to Avoid) Oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS Carbon monoxide, carbon dioxide

SECTION X - PHYSICAL DATA

MELTING POINT	-93.9°C	VAPOR PRESSURE	92 mmHg @ 20°C	VOLATILES	100%
BOILING POINT	65°C	SOLUBILITY IN WATER	miscible	EVAPORATION RATE	No Data
SPECIFIC GRAVITY (H_2O = 1)	0.7914 @ 20°C	pH	Not Applicable	VAPOR DENSITY (Air = 1)	1.11

INFORMATION FURNISHED BY: Environmental Hygiene and Toxicology (203) 789-5436

DATE November 25, 1985

222 Red School Lane Phillipsburg, N.J. 08865
24-Hour Emergency Telephone -- (201) 859-2151
Chemtrec # (800) 424-9300
National Response Center # (800) 424-8802

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SAFETY DATA SHEET

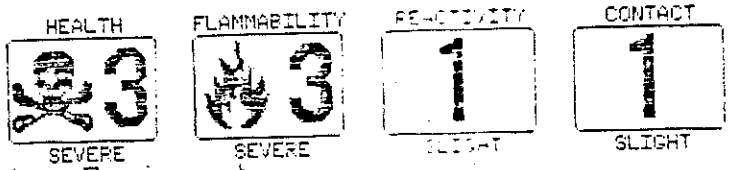
. J15 -04 JAN 1987 Methanol
Effective: 09/26/86 Issued: 01/05/87

SECTION I - PRODUCT IDENTIFICATION

Product Name: Methanol
Formula: CH_3OH
Formula Wt: 32.04
CAS No.: 00067-56-1
NIOSH/RTECS No.: PC1400000
Common Synonyms: Methyl Alcohol; Wood Alcohol; Carbinol; Methylol; Wood Spirit.
Product Codes: 9049,9072,9075,9078,9071,5317,5370,9074,P704,9093,5539,9093 9073,9091,9263,9069,9070

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA™ System



Laboratory Protective Equipment

Precautionary Label Statements

POISON! DANGER!
FLAMMABLE
HARMFUL IF INHALED
CANNOT BE MADE NON-POISONOUS
MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED
Keep away from heat, sparks, flame. Do not get in eyes, on skin, on clothing. Avoid breathing vapor. Keep in tightly closed container. Use with adequate ventilation. Wash thoroughly after handling. In case of fire, use alcohol foam, dry chemical, carbon dioxide - water may be ineffective. Flush spill area with water spray.

SECTION II - HAZARDOUS COMPONENTS

Component	%	CAS No.

Continued on Page: 2

SECTION II - HAZARDOUS COMPONENTS (Continued)

Methanol	90-100	67-56-1

SECTION III - PHYSICAL DATA

Boiling Point: 65°C (149°F)

Vapor Pressure(mmHg): 94

Melting Point: -98°C (-144°F)

Vapor Density(air=1): 1.11

Specific Gravity: 0.79
(H_2O=1)

Evaporation Rate: 4.6
(Butyl Acetate=1)

Solubility(H_2O): Complete (in all proportions)

% Volatiles by Volume: 100

Appearance & Odor: Clear, colorless liquid with characteristic pungent odor.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Closed Cup): 12°C (54°F)

NFPA 704M Rating: 1-3-0

Flammable Limits: Upper - 36.0 %

Lower - 6.0 %

Fire Extinguishing Media

Use alcohol foam, dry chemical or carbon dioxide.
(Water may be ineffective.)

Special Fire-Fighting Procedures

Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode. Move containers from fire area if it can be done without risk. Use water to keep fire-exposed containers cool.

Unusual Fire & Explosion Hazards

Vapors may flow along surfaces to distant ignition sources and flash back. Closed containers exposed to heat may explode. Contact with strong oxidizers may cause fire.
Burns with a clear, almost invisible flame.

Toxic Gases Produced

carbon monoxide, carbon dioxide, formaldehyde

SECTION V - HEALTH HAZARD DATA

TLV listed denotes (TLV-skin).

Threshold Limit Value (TLV/TWA): 260 mg/m^3 (200 ppm)

Short-Term Exposure Limit (STEL): 310 mg/m^3 (250 ppm)

Continued on Page 3

SECTION V - HEALTH HAZARD DATA (Continued)

Permissible Exposure Limit (PEL): 260 mg/m^3 (200 ppm)

Toxicity:	LD_{50} (oral-rat)(mg/kg)	- 5628
	LD_{50} (ipr-rat)(mg/kg)	- 9540
	LD_{50} (scu-mouse)(mg/kg)	- 9800
	LD_{50} (skn-rabbit) (g/kg)	- 20

Carcinogenicity: NTP: No IARC: No Z List: No OSHA reg: No

Effects of Overexposure

Inhalation and ingestion are harmful and may be fatal.
Inhalation may cause headache, nausea, vomiting, dizziness, narcosis, suffocation, lower blood pressure, central nervous system depression
Liquid may be irritating to skin and eyes. Prolonged skin contact may result in dermatitis. Eye contact may result in temporary corneal damage.
Ingestion may cause blindness.
Ingestion may cause nausea, vomiting, headaches, dizziness, gastrointestinal irritation.
Chronic effects of overexposure may include kidney and/or liver damage.

Medical Conditions Generally Aggravated By Exposure

None Identified

Routes Of Entry

Inhalation, ingestion, eye contact, skin contact

Emergency and First Aid Procedures

CALL A PHYSICIAN.
If swallowed, if conscious, immediately induce vomiting.
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
In case of contact, immediately flush eyes or skin with plenty of water fo at least 15 minutes while removing contaminated clothing and shoes.
Wash clothing before re-use.

SECTION VI - REACTIVITY DATA

Stability: Stable Hazardous Polymerization: Will not occur

Conditions to Avoid: heat, flame, other sources of ignition

Incompatibles: strong oxidizing agents, strong acids, aluminum

Decomposition Products: carbon monoxide, carbon dioxide, formaldehyde

Continued on Page: 4

SECTION VII - SPILL AND DISPOSAL PROCEDURES

Steps to be taken in the event of a spill or discharge

Wear self-contained breathing apparatus and full protective clothing. Shut off ignition sources; no flares, smoking or flames in area. Stop leak if you can do so without risk. Use water spray to reduce vapors. Take up with sand or other non-combustible absorbent material and place into container for later disposal. Flush area with water.

J. T. Baker Solusorb® solvent adsorbent is recommended for spills of this product.

Disposal Procedure

Dispose in accordance with all applicable federal, state, and local environmental regulations.

EPA Hazardous Waste Number: U154 (Toxic Waste)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

...ntilation:	Use general or local exhaust ventilation to meet TLV requirements.
Respiratory Protection:	Respiratory protection required if airborne concentration exceeds TLV. At concentrations above 200 ppm, a self-contained breathing apparatus is advised.
Eye/Skin Protection:	Safety goggles and face shield, uniform, protective suit, rubber gloves are recommended.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA™ Storage Color Code: Red

Special Precautions

Bond and ground containers when transferring liquid. Keep container tightly closed. Store in a cool, dry, well-ventilated, flammable liquid storage area.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

Proper Shipping Name	Methanol
...zard Class	Flammable liquid
.../NA	UN1230
Labels	FLAMMABLE LIQUID
Reportable Quantity	5000 LBS.

Continued on Page: 5

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION (Continued)

INTERNATIONAL (I.M.O.)

Proper Shipping Name	Methanol
Hazard Class	3.2, 6.1
UN/NA	UN1230
Labels	FLAMMABLE LIQUID, POISON

N/A = Not Applicable or Not Available

The information published in this Material Safety Data Sheet has been compiled from our experience and data presented in various technical publications. It is the user's responsibility to determine the suitability of this information for the adoption of necessary safety precautions. We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available.

72-62-7820-01

MATERIAL SAFETY DATA SHEET

Ashland Chemical Company
DIVISION OF ASHLAND OIL, INC.
P. O. BOX 2219, COLUMBUS, OHIO 43216 • (614) 889-3333
24-HOUR EMERGENCY TELEPHONE (606) 324-1133

Ashland®

THIS MSDS COMPLIES WITH 29 CFR 1910.1200 (THE HAZARD COMMUNICATION STANDARD)

****

PRODUCT NAME: METHANOL
CAS NUMBER: 67 56 1

2006

AT&T C/P
ACCOUNTS PAYABLE
PO BOX 800
SHORT HILLS NJ 07078

05 50 029 0002640-
DATA SHEET NO: 0001447-005
LATEST REVISION DATE: 04/85-85092
PRODUCT: 7350000
INVOICE: 619726
INVOICE DATE: 10/07/85
TO: AT&T COATING CENTER
5801 W. 82ND STREET
INDIANAPOLIS IN 46278

ATTN: PLANT MGR./SAFETY DIR.

SECTION I-PRODUCT IDENTIFICATION

GENERAL OR GENERIC ID: ALCOHOL

HAZARD CLASSIFICATION: (03) FLAMMABLE LIQUID (173.115)

SECTION II-HAZARDOUS COMPONENTS

INGREDIENT	% (BY WT)	PEL	TLV	NOTE
METHYL ALCOHOL	100	200	200 PPM - SKIN	(1)

(1): SKIN ABSORPTION MAY POTENTIALLY CONTRIBUTE TO THE OVERALL EXPOSURE TO THIS MATERIAL. APPROPRIATE MEASURES SHOULD BE TAKEN TO PREVENT ABSORPTION SO THAT THE TLV IS NOT INVALIDATED

SECTION III-PHYSICAL DATA

PROPERTY	REFINEMENT	MEASUREMENT
INITIAL BOILING POINT	FOR PRODUCT	147.00 DEG F (63.88 DEG C) @ 760.00 MMHG
VAPOR PRESSURE	FOR PRODUCT	97.68 MMHG @ 68.00 DEG F (20.00 DEG C)
VAPOR DENSITY	AIR = 1	1.1
SPECIFIC GRAVITY		.793 @ 68.00 DEG F (20.00 DEG C)
PERCENT VOLATILES		100.00%
EVAPORATION RATE	(N-BUTYL ACETATE = 1)	5.91

SECTION IV-FIRE AND EXPLOSION DATA

FLASH POINT(TCC) 54.00 DEG F
(12.22 DEG C)

EXPLOSIVE LIMIT (PRODUCT) LOWER - 6.0%

EXTINGUISHING MEDIA: WATER FOG OR CARBON DIOXIDE OR DRY CHEMICAL

HAZARDOUS DECOMPOSITION PRODUCTS: MAY FORM TOXIC MATERIALS:, CARBON DIOXIDE AND CARBON MONOXIDE, VARIOUS HYDROCARBONS, ETC.

SPECIAL FIREFIGHTING PROCEDURES: WEAR SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE WHEN FIGHTING FIRES.

UNUSUAL FIRE & EXPLOSION HAZARDS: VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL ALONG THE GROUND OR MAY BE MOVED BY VENTILATION AND IGNITED BY PILOT LIGHTS, OTHER FLAMES, SPARKS, HEATERS, SMOKING, ELECTRIC MOTORS, STATIC DISCHARGE, OR OTHER IGNITION SOURCES AT LOCATIONS DISTANT FROM MATERIAL HANDLING POINT.

NEVER USE WELDING OR CUTTING TORCH ON OR NEAR DRUM (EVEN EMPTY) BECAUSE PRODUCT (EVEN JUST RESIDUE) CAN IGNITE EXPLOSIVELY.
ALL FIVE GALLON PAILS AND LARGER METAL CONTAINERS SHOULD BE GROUNDED AND/OR BONDED WHEN MATERIAL IS TRANSFERRED.

NFPA CODES: HEALTH- 1 FLAMMABILITY- 3 REACTIVITY- 0

SECTION V-HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL 200 PPM - SKIN

THRESHOLD LIMIT VALUE 200 PPM - SKIN

SEE SECTION II

EFFECTS OF OVEREXPOSURE: FOR PRODUCT

EYES - CAN CAUSE SEVERE IRRITATION, REDNESS, TEARING, BLURRED VISION.
SKIN - PROLONGED OR REPEATED CONTACT CAN CAUSE MODERATE IRRITATION, DEFATTING, DERMATITIS.

CONTINUED ON PAGE: 2

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3006

SECTION V-HEALTH HAZARD DATA (CONTINUED)

BREATHING - EXCESSIVE INHALATION OF VAPORS CAN CAUSE NASAL AND RESPIRATORY IRRITATION, DIZZINESS, WEAKNESS, FATIGUE, NAUSEA, HEADACHE, POSSIBLE UNCONSCIOUSNESS, AND EVEN ASPHYXIATION.
SWALLOWING - CAN CAUSE GASTROINTESTINAL IRRITATION, NAUSEA, VOMITING, DIARRHEA, BLINDNESS AND DEATH.

FIRST AID:

IF ON SKIN: THOROUGHLY WASH EXPOSED AREA WITH SOAP AND WATER. REMOVE CONTAMINATED CLOTHING. LAUNDER CONTAMINATED CLOTHING BEFORE RE-USE.

IF IN EYES: FLUSH WITH LARGE AMOUNTS OF WATER, LIFTING UPPER AND LOWER LIDS OCCASIONALLY, GET MEDICAL ATTENTION.

IF SWALLOWED: IMMEDIATELY DRINK TWO GLASSES OF WATER AND INDUCE VOMITING BY EITHER GIVING IPECAC SYRUP OR BY PLACING FINGER AT BACK OF THROAT. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. GET MEDICAL ATTENTION IMMEDIATELY.

IF BREATHED: IF AFFECTED, REMOVE INDIVIDUAL TO FRESH AIR. IF BREATHING IS DIFFICULT, ADMINISTER OXYGEN. IF BREATHING HAS STOPPED GIVE ARTIFICIAL RESPIRATION. KEEP PERSON WARM, QUIET AND GET MEDICAL ATTENTION.

PRIMARY ROUTE(S) OF ENTRY:

INHALATION

SKIN ABSORPTION
SKIN CONTACT

SECTION VI-REACTIVITY DATA

HAZARDOUS POLYMERIZATION: CANNOT OCCUR

STABILITY: STABLE

INCOMPATIBILITY: AVOID CONTACT WITH:, STRONG OXIDIZING AGENTS.

SECTION VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

SMALL SPILL: ELIMINATE ALL SOURCES OF IGNITION SUCH AS FLARES, FLAMES (INCLUDING PILOT LIGHTS), AND ELECTRICAL SPARKS. ABSORB LIQUID ON PAPER, VERMICULITE, FLOOR ABSORBENT, OR OTHER ABSORBENT MATERIAL AND TRANSFER TO HOOD.

LARGE SPILL: ELIMINATE ALL IGNITION SOURCES (FLARES, FLAMES INCLUDING PILOT LIGHTS, ELECTRICAL SPARKS). PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM AREA OF SPILL UNTIL CLEAN-UP HAS BEEN COMPLETED. STOP SPILL AT SOURCE, DIKE AREA OF SPILL TO PREVENT SPREADING, PUMP LIQUID TO SALVAGE TANK. REMAINING LIQUID MAY BE TAKEN UP ON SAND, CLAY, EARTH, FLOOR ABSORBENT, OR OTHER ABSORBENT MATERIAL AND SHOVELED INTO CONTAINERS. PREVENT RUN-OFF TO SEWERS, STREAMS OR OTHER BODIES OF WATER. IF RUN-OFF OCCURS, NOTIFY PROPER AUTHORITIES AS REQUIRED, THAT A SPILL HAS OCCURED.

WASTE DISPOSAL METHOD:

SMALL SPILL: ALLOW VOLATILE PORTION TO EVAPORATE IN HOOD. ALLOW SUFFICIENT TIME FOR VAPORS TO COMPLETELY CLEAR HOOD DUCT WORK. DISPOSE OF REMAINING MATERIAL IN ACCORDANCE WITH APPLICABLE REGULATIONS.

LARGE SPILL: DESTROY BY LIQUID INCINERATION. CONTAMINATED ABSORBENT MAY BE DEPOSITED IN A LANDFILL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION VIII-PROTECTIVE EQUIPMENT TO BE USED

RESPIRATORY PROTECTION: IF TLV OF THE PRODUCT OR ANY COMPONENT IS EXCEEDED, A NIOSH/MSHA JOINTLY APPROVED AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS UNDER SPECIFIED CONDITIONS. (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.

VENTILATION: PROVIDE SUFFICIENT MECHANICAL (GENERAL AND/OR LOCAL EXHAUST) VENTILATION TO MAINTAIN EXPOSURE BELOW TLV(S).

PROTECTIVE GLOVES: WEAR RESISTANT GLOVES SUCH AS:, NEOPRENE

EYE PROTECTION: CHEMICAL SPLASH GOGGLES IN COMPLIANCE WITH OSHA REGULATIONS ARE ADVISED; HOWEVER, OSHA REGULATIONS ALSO PERMIT OTHER TYPE SAFETY GLASSES. (CONSULT YOUR SAFETY EQUIPMENT SUPPLIER)

OTHER PROTECTIVE EQUIPMENT: TO PREVENT REPEATED OR PROLONGED SKIN CONTACT, WEAR IMPERVIOUS CLOTHING AND BOOTS.

SECTION IX-SPECIAL PRECAUTIONS OR OTHER COMMENTS

CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID), ALL

CONTINUED ON PAGE: 3

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SECTION IX-SPECIAL PRECAUTIONS OR OTHER COMMENTS (CONTINUED)

HAZARD PRECAUTIONS GIVEN IN THE DATA SHEET MUST BE OBSERVED.

CONTAINS METHANOL.

CANNOT BE MADE NON-POISONOUS.

ALUMINUM MAY FORM AN OXIDE SCALE ON PROLONGED EXPOSURE TO METHANOL.

OVEREXPOSURE TO COMPONENTS HAS APPARENTLY BEEN FOUND TO CAUSE THE FOLLOWING EFFECTS IN LABORATORY ANIMALS:, LIVER ABNORMALITIES, KIDNEY DAMAGE, EYE DAMAGE, LUNG DAMAGE, SPLEEN DAMAGE, BRAIN DAMAGE, NERVOUS SYSTEM DAMAGE

OVEREXPOSURE TO COMPONENTS HAS BEEN SUGGESTED AS A CAUSE OF THE FOLLOWING EFFECTS IN HUMANS:, EYE DAMAGE

THE INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH ASHLAND OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE, AND SUITABLE TO THEIR CIRCUMSTANCES.

MATERIAL SAFETY DATA SHEET

J.T.Baker CHEMICALS

J. T. Baker Chemical Co., 222 Red School Lane, Phillipsburg, N.J. 08865

CHEMICAL NAME

SECTION I . IDENTIFICATION OF PRODUCT

CHEMICAL NAME	FORMULA
Methyl Ethyl Ketone	$CH_3COC_2H_5$
SYNONYM OR CROSS REFERENCE (2-Butanone MEK)	CAS NO: 78-93-3

SECTION II . HAZARDOUS INGREDIENTS

MATERIAL	NATURE OF HAZARD

SECTION III . PHYSICAL DATA

BOILING POINT 79.6°C. (175.3°F)	MELTING POINT Freezing Point -86.3°C.
VAPOR PRESSURE @ 20°C. 70 mm Hg	SPECIFIC GRAVITY 0.806 @20°/20°C.
VAPOR DENSITY (AIR=1) 2.5	PERCENT VOLATILE BY VOLUME (%) 100%
WATER SOLUBILITY @ 20°C 2. 26.8	EVAPORATION RATE (Butyl Acetate = 1) 5.7

APPEARANCE
Clear, volatile liquid; acetone like odor

SECTION IV . FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (method used)	FLAMMABLE LIMITS	Lower	Upper
22°F. Tag Open Cup		1.8%	10%

FIRE EXTINGUISHING MEDIA: Use CO_2 or dry chemical for small fires, use alcohol type foam for large fires.

SPECIAL FIRE-FIGHTING PROCEDURES

UNUSUAL FIRE AND EXPLOSION HAZARD

SECTION V . HEALTH HAZARD

THRESHOLD LIMIT VALUE
200 ppm; 590 mg/m^3 orl-rat LD_{50}: 3400 mg/kg

HEALTH HAZARDS
Irritation of nose, throat and eyes.

FIRST AID PROCEDURES If inhaled, remove to fresh air. If swallowed, induce vomiting. In case of contact immediately flush eyes with plenty of water for at least 15 minutes. Call a physician. Flush skin with water.

SECTION VI . REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		Heat, sparks, and open flame.
	STABLE	X	

INCOMPATABILITY (materials to avoid)

HAZARDOUS DECOMPOSITION PRODUCTS
Thermal decomposition may produce carbon monoxide and/or carbon dioxide.

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII . SPILL AND DISPOSAL PROCEDURES

SPILLS
Eliminate all sources of ignition. Absorb on sand, ground or vermiculite. Carefully sweep up and remove. Flush spill area with large volumes of water. Alternatively use J.T. Baker's Flammable Solvent Spill Cleanup Kit or Solusorb® Solvent Absorbant.

DISPOSAL

Burn absorbant in a furnace. When liquid, atomize into an incinerator providing environmental regulations permit.

SECTION VIII . PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)
All purpose canister mask. Chemical cartridge respirator.

VENTILATION	LOCAL	SPECIAL
	X	
	MECHANICAL (general)	OTHER
	X	

PROTECTIVE GLOVES	EYE PROTECTION
Rubber gloves	Full face shield

OTHER PROTECTIVE EQUIPMENT
Approved working clothes

SECTION IX . HANDLING AND STORAGE PRECAUTIONS

STORAGE & HANDLING
Keep away from heat, sparks, and open flame. Keep container tightly closed.

SECTION X . MISCELLANEOUS INFORMATION

Avoid contact with eyes. Flammable liquid. Avoid breathing vapor and prolonged contact with skin. Use with adequate ventilation. Wash thoroughly after handling.

Date issued: _____

Approved by R. M. Mitchell
Manager, Quality Assurance

Revision No. & Date issued: _____

MATERIAL SAFETY DATA SHEET
(Effective Date: 9/15/88)

To comply with OSHA's Hazard Communication Standard 29 CFR 1910.1200

MICRO®

LIQUID LABORATORY CLEANER

IDENTITY (As Used in Label and List)	Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.
MICRO®	

Section I

Manufacturer's Name International Products Corporation	Emergency Telephone Number (609) 394-5480
Address (Number, Street, City, State and ZIP Code) New York Ave. & Fuld St.	Telephone Number for Information (609) 394-5480
P.O. Box 118	Date Prepared Sept. 15, 1988
Trenton, NJ 08601	Signature of Preparer (optional) Charles E. Granito, Pres.

Section II—Hazardous Ingredients/Identity Information

No MICRO ingredient present at 1% or more is contained in the SARA Title III 313 list.

For medical reference purposes the following information is provided on MICRO composition

Cations: Sodium, Ammonium (less than 1%), Triethanolammonium
Anions: Ethylenediamine Tetraacetate, Linear Alkyl Aryl Sulfonates
Nonionics: Polyethoxynonylphenol

Note: Since this product contains polyethoxylates, it may contain trace amounts of ethylene oxide (CAS #75-21-8). Ethylene oxide is listed as a potential carcinogen by OSHA, NTP, and IARC. If this product is handled as recommended in this MSDS any trace amounts of ethylene oxide that may be present are not expected to result in acute or chronic hazards. A recent test (results available on request) on MICRO could not detect ethylene oxide (detection limit 0.70 ppm), ethylene chlorohydrin (detection limit 7.0 ppm), or ethylene glycol (detection limit 19.9 ppm).

Section III—Physical/Chemical Characteristics

Boiling Point	215 °F	Specific Gravity ($H_2O = 1$)	1.14
Vapor Pressure (mm Hg.)	NA	Melting Point	NA
Vapor Density (AIR = 1)	NA	Evaporation Rate (Butyl Acetate = 1)	NA
Solubility in Water Complete		Viscosity	8.2 cp
		pH	9.7

Appearance and Odor

Light Yellow Liquid, Slight Ammonia Odor

Section IV—Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
None—does not burn	NA	NA	NA

Extinguishing Media

None—does not burn

Special Fire Fighting Procedure

None

Unusual Fire and Explosion Hazards

None

NA = Not applicable

Based on OSHA 174, Sept., 1985

Section V—Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable	X	None

Incompatibility (Materials to Avoid)
May etch zinc and aluminum

Hazardous Decomposition or Byproducts
Not known

Hazardous Polymerization	May Occur		Conditions to Avoid Not applicable
	Will Not Occur	X	

Section VI—Health Hazard Data

Note: All test results were obtained on undiluted product.

Recommended concentration of Micro for most applications is 2% by volume.

Copies of test results available on request.

Health Hazards (Acute and Chronic)

Eye Irritant—caused transient irritation effects in 4 of 6 rabbits. Did not affect cornea.

Skin—moderate irritant (PPI = 3.88, rabbits). No evidence of corrosivity.

Prolonged use may cause drying/chapping.

Inhalation—prolonged exposure may cause slight nose and throat irritation.

Swallowing—very large amounts could cause cramps and muscle spasms. LD_{50} greater than 5g/kg (rats, oral)

Carcinogenicity:	NTP?	IARC Monographs?	OSHA Regulated?
Not listed	Not listed	Not listed	Not listed

Signs and Symptoms of Exposure
Redness of eyes and/or skin

Medical Conditions Generally Aggravated by Exposure
Not known

Emergency and First Aid Procedures

Eyes—wash out with water for 15 minutes—call physician

Skin—wash with soap and water; remove contaminated clothing and wash before reuse

Inhalation—remove to fresh air

Swallowing—give 2 glasses of water, call physician, do not induce vomiting. Never give anything by mouth to an unconscious person.

Note to physician: There is no specific antidote. Consider calcium gluconate IV for systemic reaction.

Treatment of overexposure should be directed at the control of symptoms and the clinical condition.

Ingestion of very large quantity could cause hypocalcemic tetany.

Section VII—Precautions for Safe Handling and Use

Steps to be Taken in Case Material is Released or Spilled

Large spill—collect liquid with absorbent material and package for disposal according to local, state, and federal regulations.

Small spills—flush with water.

Waste Disposal Method

Normal sewage disposal—consult with appropriate authorities; biodegradable, pH = 9.7

Precautions to be taken in Handling and Storing

Do not store in contact with aluminum, zinc, copper, or their alloys

Other Precautions
Avoid eye contact

Section VIII—Control Measures

Respiratory Protection (Specify Type)
Not normally needed

Ventilation	Local Exhaust General industrial requirements	Special NA
	Mechanical (General) NA	Other NA

Protective Gloves Waterproof gloves	Eye Protection Protective glasses or goggles. As a general rule do not wear contact lenses when handling chemicals

Other Protective Clothing or Equipment
Safety eye bath should be available

Work/Hygienic Practices
Wash with soap and water after use

MATERIAL SAFETY DATA SHEET

NPCA 1-

(Approved by U S Department of Labor "Essentially Similar" to Form OSHA-20)

OF PREP 8/30/82

Section I

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MANUFACTURER'S NAME Shipley Company, Inc.

STREET ADDRESS 2300 Washington St. CITY, STATE, AND ZIP CODE Newton, Massachusetts 02162

EMERGENCY TELEPHONE NO (617) 969-5500

PRODUCT CLASS Photoresist

MANUFACTURERS CODE IDENTIFICATION MICROPOSIT^{tm} 111 S PHOTO RESIST

DE NAME MICROPOSIT^{tm} 111 S PHOTO RESIST

Section II — HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	TLV PPM	TLV mg/m³	LEL	VAPOR PRESSURE
Formula Proprietary					
Cellosolve acetate	60	50	270	1.7%	-
n-butyl acetate	7	150	710	1.7%	-
Xylene	7	100	435	1.1%	-
Toluene	5	100	375	1.3%	-

Section III — PHYSICAL DATA

BOILING RANGE begins ca. 121°C

VAPOR DENSITY [X] HEAVIER [ ] LIGHTER THAN AIR

EVAPORATION RATE [ ] FASTER [X] SLOWER THAN ETHER

PERCENT VOLATILE 80% by weight

WEIGHT PER GALLON approx. 8.2 lbs.

Section IV — FIRE AND EXPLOSION HAZARD DATA

DOT CATEGORY Flammable liquid, n.o.s.

FLASH POINT 94°F (closed cup)

LEL Unknown

EXTINGUISHING MEDIA Alcohol foam, carbon dioxide, dry chemical

UNUSUAL FIRE AND EXPLOSION HAZARDS pressure builds up in closed containers. This is accelerated by heat with possible liberation of combustible vapors.

SPECIAL FIRE FIGHTING PROCEDURES Use procedures normal for flammable liquid fires. Containers near fire may be cooled with water.

Section V — HEALTH HAZARD DATA

IESHOLD LIMIT VALUE see Section II

FECTS OF OVEREXPOSURE High concentrations of vapors are irritating to eyes and respiratory tract and can cause narcosis.
Ingestion will cause violent vomiting and diarrhea, which can lead to collapse.

EMERGENCY AND FIRST AID PROCEDURES If swallowed: contact physician immediately; Eye contact: flush wit water for 15 minutes - contact physician immediately; Skin contact: flush with copious amounts of water; Inhalation: move to fresh air - contact physician immediately.

Section VI — REACTIVITY DATA

STABILITY ☐ UNSTABLE ☒ STABLE CONDITIONS TO AVOID Heat, sparks, flames.

INCOMPATABILITY (*Materials to avoid*) Oxidants

HAZARDOUS DECOMPOSITION PRODUCTS Details unknown, may emit toxic fumes if burned.

HAZARDOUS POLYMERIZATION ☐ MAY OCCUR ☒ WILL NOT OCCUR

CONDITIONS TO AVOID

Section VII — SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED If spilled, eliminate sources of ignition, provide ventilation, collect with absorbent material into suitable container.

.STE DISPOSAL METHOD

Dispose of in accordance with local ordinances.

Section VIII — SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION For spray applications, use a filter mask. For other applications, no protection is needed, if adequate ventilation is provided. See below.

VENTILATION Local or general room exhaust is required.

PROTECTIVE GLOVES Rubber gloves

EYE PROTECTION Chemical goggles

OTHER PROTECTIVE EQUIPMENT Suitable protective clothing to prevent skin contact.

Section IX — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING Store in closed original container in a cool place between 10° and 21°C. For maximum resist cleanness, use within 6 weeks. Avoid storing longer than 1 year.

OTHER PRECAUTIONS None

The information and recommendations contained herein are believed to be accurate. However, no guarantee or warranty, expressed or implied, is made.

M A T E R I A L S A F E T Y D A T A S H E E T

Shipley Company Inc.
2300 Washington Street
Newton, Massachusetts 02162
Emergency Phone: (617) 969-5500

EFFECTIVE DATE: 15 November 1985

PRODUCT NAME: MICROPOSIT® REMOVER 1112A

PRODUCT CLASS: Remover

SECTION I - HAZARDOUS COMPONENTS

COMPONENT	CAS NO.	WEIGHT PERCENT	ACGIH TLV PPM(mg/m3)	CARCINOGEN STATUS
Ethanolamine	141-43-5	15	3(8)	N.A.
2-butoxyethanol	111-76-2	27	25(120)	N.A.
Dipropylene glycol methyl ether	34590-94-8	14	100(600)	N.A.
Furfuryl alcohol	90-00-0	1	10(40)	N.A.
Proprietary glycol ethers		28	N.A.	N.A.

Other proprietary ingredients, including water, not deemed hazardous per OSHA Hazard Communication Standard. 15

SECTION II - PHYSICAL DATA

BOILING POINT: approx. 212°F

VAPOR PRESSURE (mmHg):

ethanolamine	0.4mm at 20°C
2-butoxyethanol	0.6mm at 20°C
dipropylene glycol methyl ether	<0.1mm at 20°C
furfuryl alcohol	1mm at 32°C

pH: approx. 12

VAPOR DENSITY(AIR=1): Heavier than air

SOLUBILITY IN WATER: Complete

APPEARANCE AND ODOR: Pale yellow liquid with an "organic" odor.

SPECIFIC GRAVITY: Approx. 1.0-1.1

% VOLATILE BY VOL: 70%

EVAPORATION RATE: Slower than ether

SECTION III - PHYSICAL HAZARDS

DOT PROPER SHIPPING NAME: Alkaline Liquid, N.O.S.

DOT HAZARD CLASSIFICATION: Corrosive Liquid

DOT HAZARD IDENTIFICATION NUMBER: NA1719

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 179°F METHOD USED: PMCC

LOWER EXPLOSION LIMIT:

2-butoxyethanol	1.1%
dipropylene glycol methyl ether	1.0%
furfuryl alcohol	1.8%

EXTINGUISHING MEDIA: Alcohol foam, carbon dioxide, dry chemical

SPECIAL FIRE FIGHTING PROCEDURES: Self contained breathing apparatus should be used.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Pressure may build up in closed containers. This is accelerated by heat with possible liberation of combustible vapors.

M A T E R I A L S A F E T Y D A T A S H E E T
Shipley Company Inc, Newton, Massachusetts 02162
Emergency Phone: (617) 969-5500
MICROPOSIT® REMOVER 1112A

REACTIVITY DATA

STABILITY: Stable
CONDITIONS TO AVOID: Heat, sparks, flame
INCOMPATIBILTY: Oxidants
HAZARDOUS DECOMPOSITION PRODUCTS: Details unknown. May emit toxic fumes if burned.
HAZARDOUS POLYMERIZATION: Will not occur.

SECTION V - HEALTH HAZARDS

EXPOSURE LIMITS: Not established. Vapor concentrations should be below the TLV for ethanolamine.

ROUTES OF ENTRY: Inhalation, ingestion, eye and skin contact, skin absorption.

ACUTE EFFECTS: Vapors are irritating to eyes, nose and respiratory tract. Overexposure to vapors may cause headache, nausea, vomiting. Vapors have an objectionable odor.

Contact with eyes or skin contact may cause severe burns. Material may be absorbed through intact skin and may cause burns to underlying tissues.

Ingestion may cause headache, nausea, vomiting, dizziness, weakness.

CHRONIC EFFECTS: Prolonged, repeated contact may result in dermatitis. Prolonged or widespread contact with skin may lead to absorption of harmful amounts of solvent with accompanying signs and symptoms of toxicity as described for swallowing.

EMERGENCY FIRST AID PROCEDURES:

INGESTION: Contact physician
EYE CONTACT: Flush with water immediately for at least 15 minutes, then contact a physician.
SKIN CONTACT: Flush skin with plenty of water. Contact a physician if irritation persists.
INHALATION: Move to fresh air.

SECTION VI - SPILL, LEAK AND DISPOSAL PROCEDURES

ACTION TO TAKE FOR SPILLS: If spilled eliminate sources of ignition, provide adequate ventilation and suitable protective clothing. Collect with absorbent material into suitable closed container. Transport to outside location.
DISPOSAL METHOD: Dispose of in accordance with all federal, state and local regulations. Contact Shipley Technical Service Representative if further assistance is needed.

SECTION VII - PRECAUTIONS FOR SAFE USE AND HANDLING

VENTILATION: Provide adequate local exhaust ventilation.
RESPIRATORY PROTECTION: Not normally required when adequate exhaust is provided. In situations where vapor concentrations may exceed the TLV's, use a NIOSH/MSHA approved respirator with an organic vapor cartridge.
EYE PROTECTION: Chemical goggles.
PROTECTIVE CLOTHING: Chemical gloves. Adequate protective clothing to prevent skin contact.
WORK PRACTICES: Avoid skin contact. Practice good personal hygiene to prevent accidental exposure.

SECTION VIII - SPECIAL PRECAUTIONS AND ADDITIONAL INFORMATION

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: WARNING! Corrosive liquid. Store in closed original container in a cool, dry area at 10-21°C. Keep away from light, oxidants, heat and sources of ignition. Avoid storing longer than 1 year.

N.A. Denotes no applicable information was found.

THE INFORMATION AND RECOMMENDATIONS CONTAINED HEREIN ARE BELIEVED TO BE ACCURATE. HOWEVER, NO GUARANTEE OR WARRANTY, EXPRESSED OR IMPLIED IS GIVEN.

PREPARED BY: Angela Boggs
Corporate Environmental Health and Safety

118501

MATERIAL SAFETY DATA SHEET

NPCA

E OF PREP April 1982

(Approved by U S Department of Labor "Essentially Similar" to Form OSHA-20)

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Section I

MANUFACTURER S NAME Shipley Company, Inc.

EET ADDRESS 2300 Washington St. CITY, STATE, AND ZIP CODE Newton, Massachusetts 02162

EMERGENCY TELEPHONE NO (617) 969-5500

PRODUCT CLASS Photoresist

MANUFACTURERS CODE IDENTIFICATION

DE NAME MICROPOSIT^{tm} 135Q J PHOTO RESIST MICROPOSIT^{tm} 1350 J PHOTO RESIST

Section II — HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	TLV PPM	TLV mg/m³	LEL	VAPOR PRESSURE
Formula Proprietary					
Cellosolve acetate	60	50	270	1.7%	-
n-butyl acetate	5	150	710	1.7%	-
Xylene	5	100	435	1.1%	-

Section III — PHYSICAL DATA

BOILING RANGE begins ca. 115°C

VAPOR DENSITY [X] HEAVIER. [ ] LIGHTER THAN AIR

EVAPORATION RATE [ ] FASTER [X] SLOWER THAN ETHER

PERCENT VOLATILE 70% by weight

WEIGHT PER GALLON approx. 8.4 lbs.

Section IV — FIRE AND EXPLOSION HAZARD DATA

DOT CATEGORY Combustible liquid, n.o.s.

FLASH POINT 106 - 125°F (closed cup)

LEL Unkno

EXTINGUISHING MEDIA Alcohol foam, carbon dioxide, dry chemical

UNUSUAL FIRE AND EXPLOSION HAZARDS pressure builds up in closed containers. This is accelerated by heat with possible liberation of combustible vapors.

SPECIAL FIRE FIGHTING PROCEDURES Use procedures normal for flammable liquid fires. Containers near fire may be cooled with water.

Section V — HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: see Section II

EFFECTS OF OVEREXPOSURE: High concentrations of vapors are irritating to eyes and respiratory tract and can cause narcosis.
Ingestion will cause violent vomiting and diarrhea, which can lead to collapse.

EMERGENCY AND FIRST AID PROCEDURES: If swallowed: contact physician immediately; Eye contact: flush with water for 15 minutes - contact physician immediately; Skin contact: flush with copious amounts of water; Inhalation: move to fresh air - contact physician immediately

Section VI — REACTIVITY DATA

STABILITY ☐ UNSTABLE ☒ STABLE

CONDITIONS TO AVOID: Heat, sparks, flames.

INCOMPATABILITY (*Materials to avoid*): Oxidants

HAZARDOUS DECOMPOSITION PRODUCTS: Details unknown, May emit toxic fumes if burned.

HAZARDOUS POLYMERIZATION ☐ MAY OCCUR ☒ WILL NOT OCCUR

CONDITIONS TO AVOID

Section VII — SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: If spilled, eliminate sources of ignition, provide ventilation, collect with absorbent material into suitable container.

WASTE DISPOSAL METHOD

Dispose of in accordance with local ordinances.

Section VIII — SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: For spray applications, use a filter mask. For other applications, no protection is needed, if adequate ventilation is provided. See below.

VENTILATION: Local or general room exhaust is required.

PROTECTIVE GLOVES: Rubber gloves

EYE PROTECTION: Chemical goggles

OTHER PROTECTIVE EQUIPMENT: Suitable protective clothing to prevent skin contact.

Section IX — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store in closed original container in a cool place between 10° and 21°C. For maximum resist cleanness, use within 6 weeks. Avoid storing longer than 1 year.

OTHER PRECAUTIONS: None

The information and recommendations contained herein are believed to be accurate. However, no guarantee or warranty, expressed or implied, is made.

M A T E R I A L S A F E T Y D A T A S H E E T

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Shipley Company Inc.
2300 Washington Street
Newton, Massachusetts 02162
Emergency Phone: (617) 969-5500

EFFECTIVE DATE: 15 November 1985

PRODUCT NAME: MICROPOSIT® 1400 PHOTO RESIST

PRODUCT CLASS: Photoresist

SECTION I - HAZARDOUS COMPONENTS

Dash number of specific dilution refers to the percent solids. Solids portion consists of a proprietary blend of novolak resins and photoactive compounds. Remainder is solvent consisting of:

COMPONENT	CAS NO.	WEIGHT PERCENT	ACGIH TLV PPM(mg/m3)	CARCINOGEN STATUS
2-ethoxyethyl acetate	111-15-9	82	5(27)	N.A.
n-butyl acetate	123-86-4	9	150(710)	N.A.
xylene	1330-20-7	9	100(435)	N.A.

SECTION II - PHYSICAL DATA

BOILING RANGE: begins ca. 120°C.

VAPOR PRESSURE (mmHg):
- 2-ethoxyethyl acetate 1.2mm at 20°C.
- n-butyl acetate 15mm at 25°C.
- xylene 6mm at 20°C.

VAPOR DENSITY(AIR=1): Heavier than air

SOLUBILITY IN WATER: Not soulble.

WEIGHT PER GALLON: Approx. 8.5 lbs

% VOLATILE BY WEIGHT Varies with dilution

EVAPORATION RATE: Slower than ether

pH: N.A.

APPEARANCE AND ODOR: Red/amber viscous solution with slightly sweet odor.

SECTION III - PHYSICAL HAZARDS

DOT PROPER SHIPPING NAME: Combustible Liquid, N.O.S.
DOT HAZARD CLASSIFICATION: Combustible Liquid
DOT HAZARD IDENTIFICATION NUMBER: NA1993

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 106-125°F. METHOD USED: PMCC

LOWER EXPLOSION LIMIT:
- 2-ethoxyethyl acetate 1.7%
- n-butyl acetate 1.7%
- xylene 1.1%

EXTINGUISHING MEDIA: Alcohol foam,carbon dioxide, dry chemical

SPECIAL FIRE FIGHTING PROCEDURES: Use normal procedures for flammable liquid fires. Containers near fire may be cooled with water.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Pressure may build up in closed containers. This is accelerated by heat with possible liberation of combustible vapors.

M A T E R I A L S A F E T Y D A T A S H E E T
Shipley Company Inc, Newton, Massachusetts 02162
Emergency Phone: (617) 969-5500
MICROPOSIT® 1400 PHOTO RESIST

REACTIVITY DATA

STABILITY: Stable
CONDITIONS TO AVOID: Heat, sparks, flame
INCOMPATIBILITY: Oxidants
HAZARDOUS DECOMPOSITION PRODUCTS: Details unknown. May emit toxic fumes if burned.
HAZARDOUS POLYMERIZATION: Will not occur.

SECTION V - HEALTH HAZARDS

EXPOSURE LIMITS: Not established. Vapor concentrations should be below the TLV for 2-ethoxyethyl acetate.

ROUTES OF ENTRY: Inhalation, ingestion, skin absorption.

ACUTE EFFECTS: Vapors are irritating to eyes, nose and respiratory tract. Overexposure to vapors may result in headache, nausea, vomiting. Vapors have an objectionable odor.

Ingestion may cause headache, nausea, vomiting, dizziness, weakness. Possible kidney damage may result from ingestion of large quantities of material.

CHRONIC EFFECTS: Contact with skin may cause irritation with prolonged contact. Prolonged, repeated contact may result in dermatitis. Prolonged or widespread contact with skin may lead to absorption of harmful amounts of solvent with accompanying signs and symptoms of toxicity as described for swallowing.

NOTE: When laboratory animals have been overexposed to 2-ethoxyethyl acetate, birth defects and adverse effects on pregnancy have been observed.

EMERGENCY FIRST AID PROCEDURES:

INGESTION: Contact physician
EYE CONTACT: Flush with water immediately for at least 15 minutes, then contact a physician.
SKIN CONTACT: Flush skin with plenty of water. Contact a physician if irritation persists.
INHALATION: Move to fresh air.

M A T E R I A L S A F E T Y D A T A S H E E T
Shipley Company Inc, Newton, Massachusetts 02162
Emergency Phone: (617) 969-5500
MICROPOSIT® 1400 PHOTO RESIST

SECTION VI - SPILL, LEAK AND DISPOSAL PROCEDURES

ACTION TO TAKE FOR SPILLS: If spilled eliminate sources of ignition, provide adequate ventilation and suitable protective clothing. Collect with absorbent material into suitable closed container. Transport to outside location.
DISPOSAL METHOD: Dispose of in accordance with all federal, state and local regulations. Contact Shipley Technical Service Representative if further assistance is needed.

SECTION VII - PRECAUTIONS FOR SAFE USE AND HANDLING

VENTILATION: Provide adequate local exhaust ventilation.
RESPIRATORY PROTECTION: Not normally required when adequate exhaust is provided. In situations where vapor concentrations may exceed the TLV's, use a NIOSH/MSHA approved respirator with an organic vapor cartridge.
EYE PROTECTION: Chemical goggles.
PROTECTIVE CLOTHING: Butyl rubber gloves. Adequate protective clothing to prevent skin contact.
WORK PRACTICES: Avoid skin contact. Practice good personal hygiene to prevent accidental exposure.

SECTION VIII - SPECIAL PRECAUTIONS AND ADDITIONAL INFORMATION

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: CAUTION! Combustible liquid. Store in closed original container in a cool, dry area at 10-21°C. Keep away from light, oxidants, heat and sources of ignition. Avoid storing longer than 1 year.

N.A. Denotes no applicable information was found.

THE INFORMATION AND RECOMMENDATIONS CONTAINED HEREIN ARE BELIEVED TO BE ACCURATE. HOWEVER, NO GUARANTEE OR WARRANTY, EXPRESSED OR IMPLIED IS GIVEN.

PREPARED BY: Angela Boggs
Corporate Environmental Health and Safety

118501

M A T E R I A L S A F E T Y D A T A S H E E T

Shipley Company Inc.
2300 Washington Street
Newton, Massachusetts 02162
Emergency Phone: (617) 969-5500

EFFECTIVE DATE: 15 November 1985

PRODUCT NAME: MICROPOSIT® 1400 PHOTORESIST

PRODUCT CLASS: Photoresist

SECTION I - HAZARDOUS COMPONENTS

Dash number of specific dilution refers to the percent solids. Solids portion consists of a proprietary blend of novolak resins and photoactive compounds. Remainder is solvent consisting of:

COMPONENT	CAS NO.	WEIGHT PERCENT	ACGIH TLV PPM(mg/m3)	CARCINOGEN STATUS
2-ethoxyethyl acetate	111-15-9	82	5(27)	N.A.
n-butyl acetate	123-86-4	9	150(710)	N.A.
xylene	1330-20-7	9	100(435)	N.A.

SECTION II - PHYSICAL DATA

BOILING RANGE: begins ca. 120°C.

VAPOR PRESSURE (mmHg):
- 2-ethoxyethyl acetate 1.2mm at 20°C.
- n-butyl acetate 15mm at 25°C.
- xylene 6mm at 20°C.

VAPOR DENSITY(AIR=1): Heavier than air

SOLUBILITY IN WATER: Not soulble.

WEIGHT PER GALLON: Approx. 8.5 lbs

% VOLATILE BY WEIGHT Varies with dilution

EVAPORATION RATE: Slower than ether

pH: N.A.

APPEARANCE AND ODOR: Red/amber viscous solution with slightly sweet odor.

SECTION III - PHYSICAL HAZARDS

DOT PROPER SHIPPING NAME: Combustible Liquid, N.O.S.
DOT HAZARD CLASSIFICATION: Combustible Liquid
DOT HAZARD IDENTIFICATION NUMBER: NA1993

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 106-125°F. METHOD USED: PMCC

LOWER EXPLOSION LIMIT:
- 2-ethoxyethyl acetate 1.7%
- n-butyl acetate 1.7%
- xylene 1.1%

EXTINGUISHING MEDIA: Alcohol foam,carbon dioxide, dry chemical

SPECIAL FIRE FIGHTING PROCEDURES: Use normal procedures for flammable liquid fires. Containers near fire may be cooled with water.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Pressure may build up in closed containers. This is accelerated by heat with possible liberation of combustible vapors.

M A T E R I A L S A F E T Y D A T A S H E E T
Shipley Company Inc, Newton, Massachusetts 02162
Emergency Phone: (617) 969-5500
MICROPOSIT® 1400 PHOTO RESIST

REACTIVITY DATA

STABILITY: Stable
CONDITIONS TO AVOID: Heat, sparks, flame
INCOMPATIBILITY: Oxidants
HAZARDOUS DECOMPOSITION PRODUCTS: Details unknown. May emit toxic fumes if burned.
HAZARDOUS POLYMERIZATION: Will not occur.

SECTION V - HEALTH HAZARDS

EXPOSURE LIMITS: Not established. Vapor concentrations should be below the TLV for 2-ethoxyethyl acetate.

ROUTES OF ENTRY: Inhalation, ingestion, skin absorption.

ACUTE EFFECTS: Vapors are irritating to eyes, nose and respiratory tract. Overexposure to vapors may result in headache, nausea, vomiting. Vapors have an objectionable odor.

Ingestion may cause headache, nausea, vomiting, dizziness, weakness. Possible kidney damage may result from ingestion of large quantities of material.

CHRONIC EFFECTS: Contact with skin may cause irritation with prolonged contact. Prolonged, repeated contact may result in dermatitis. Prolonged or widespread contact with skin may lead to absorption of harmful amounts of solvent with accompanying signs and symptoms of toxicity as described for swallowing.

NOTE: When laboratory animals have been overexposed to 2-ethoxyethyl acetate, birth defects and adverse effects on pregnancy have been observed.

EMERGENCY FIRST AID PROCEDURES:

INGESTION: Contact physician
EYE CONTACT: Flush with water immediately for at least 15 minutes, then contact a physician.
SKIN CONTACT: Flush skin with plenty of water. Contact a physician if irritation persists.
INHALATION: Move to fresh air.

M A T E R I A L S A F E T Y D A T A S H E E T
Shipley Company Inc, Newton, Massachusetts 02162
Emergency Phone: (617) 969-5500
MICROPOSIT® 1400 PHOTO RESIST

SECTION VI - SPILL, LEAK AND DISPOSAL PROCEDURES

ACTION TO TAKE FOR SPILLS: If spilled eliminate sources of ignition, provide adequate ventilation and suitable protective clothing. Collect with absorbent material into suitable closed container. Transport to outside location.
DISPOSAL METHOD: Dispose of in accordance with all federal, state and local regulations. Contact Shipley Technical Service Representative if further assistance is needed.

SECTION VII - PRECAUTIONS FOR SAFE USE AND HANDLING

VENTILATION: Provide adequate local exhaust ventilation.
RESPIRATORY PROTECTION: Not normally required when adequate exhaust is provided. In situations where vapor concentrations may exceed the TLV's, use a NIOSH/MSHA approved respirator with an organic vapor cartridge.
EYE PROTECTION: Chemical goggles.
PROTECTIVE CLOTHING: Butyl rubber gloves. Adequate protective clothing to prevent skin contact.
WORK PRACTICES: Avoid skin contact. Practice good personal hygiene to prevent accidental exposure.

SECTION VIII - SPECIAL PRECAUTIONS AND ADDITIONAL INFORMATION

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: CAUTION! Combustible liquid. Store in closed original container in a cool, dry area at 10-21°C. Keep away from light, oxidants, heat and sources of ignition. Avoid storing longer than 1 year.

N.A. Denotes no applicable information was found.

THE INFORMATION AND RECOMMENDATIONS CONTAINED HEREIN ARE BELIEVED TO BE ACCURATE. HOWEVER, NO GUARANTEE OR WARRANTY, EXPRESSED OR IMPLIED IS GIVEN.

PREPARED BY: Angela Bogga
Corporate Environmental Health and Safety

118501

M A T E R I A L S A F E T Y D A T A S H E E T

3926

Shipley Company Inc.
2300 Washington Street
Newton, Massachusetts 02162
Emergency Phone: (617) 969-5500

EFFECTIVE DATE: 15 November 1985

PRODUCT NAME: MICROPOSIT® 351 DEVELOPER

PRODUCT CLASS: Developer

SECTION I - HAZARDOUS COMPONENTS

COMPONENT	CAS NO.	PERCENT	TLV mg/m^3	CARCINOGEN STATUS
Sodium Hydroxide	1310-73-2	5	2	N.A.

Proprietary ingredients, including water, not deemed hazardous per OSHA Hazard Communication Standard.

SECTION II - PHYSICAL DATA

BOILING POINT: > 212°F
VAPOR PRESSURE (mmHg): N.A.
% VOLATILE BY VOL: N.A.
EVAPORATION RATE: N.A.
VAPOR DENSITY(AIR=1): N.A.
SPECIFIC GRAVITY: Approx. 1.0-1.1
SOLUBILITY IN WATER: Complete
pH: > 12
APPEARANCE AND ODOR: Water white liquid with no noticeable odor.

SECTION III - PHYSICAL HAZARDS

DOT PROPER SHIPPING NAME: Sodium Hydroxide Solution
DOT HAZARD CLASSIFICATION: Corrosive Material
DOT HAZARD IDENTIFICATION NUMBER: UN1824

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: Non-flammable **METHOD USED:** N.A.
EXTINGUISHING MEDIA: Water, carbon dioxide, dry chemicals
SPECIAL FIRE FIGHTING PROCEDURES: None
UNUSUAL FIRE AND EXPLOSION HAZARDS: None known

REACTIVITY DATA

STABILITY: Stable
CONDITIONS TO AVOID: None known
INCOMPATIBILITY: Acids
DECOMPOSITION PRODUCTS: Neutralization produces heat.
HAZARDOUS POLYMERIZATION: Will not occur.

M A T E R I A L S A F E T Y D A T A S H E E T
Shipley Company Inc, Newton, Massachusetts 02162
Emergency Phone: (617) 969-5500
MICROPOSIT® 351 DEVELOPER

SECTION V - HEALTH HAZARDS

EXPOSURE LIMITS: Not established. Avoid exposure to mists or vapors above component TLV.
ROUTES OF ENTRY: Inhalation of mist, ingestion, eye and skin contact.
ACUTE EFFECTS: Contact with eyes may cause irritation or burns. Contact with skin and mucous membranes may cause irritation.
CHRONIC EFFECTS: None known.

EMERGENCY FIRST AID PROCEDURES:
INGESTION: Contact physician immediately.
EYE CONTACT: Flush with water immediately for at least 15 minutes, then contact a physician.
SKIN CONTACT: Flush skin with plenty of water. Contact a physician if irritation persists.
INHALATION: Move to fresh air.

SECTION VI - SPILL, LEAK AND DISPOSAL PROCEDURES

ACTION TO TAKE FOR SPILLS: Flush with cold water into waste treatment system for neutralization. Spills may be absorbed with appropriate absorbent material for dilute alkaline solutions and placed in container for disposal.
DISPOSAL METHOD: Dispose of in accordance with all federal, state and local regulations. Contact Shipley Technical Service Representative if further assistance is needed.

SECTION VII - PRECAUTIONS FOR SAFE USE AND HANDLING

VENTILATION: Provide adequate general exhaust ventilation.
RESPIRATORY PROTECTION: None normally required unless product is sprayed. In situations where mists or vapors may form (such as spraying), use a NIOSH approved respirator.
EYE PROTECTION: Chemical goggles.
PROTECTIVE CLOTHING: Chemical gloves and suitable protective clothing to prevent skin contact.
WORK PRACTICES: Avoid skin contact. Practice good personal hygiene to prevent accidental exposure.

SECTION VIII - SPECIAL PRECAUTIONS AND ADDITIONAL INFORMATION

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: WARNING! Corrosive liquid. Treat as a dilute alkaline solution. Store in closed original container in a cool, dry area at 50-90°F. Keep away from acids. Do not store in direct sunlight.

N.A. Denotes no applicable information was found.

THE INFORMATION AND RECOMMENDATIONS CONTAINED HEREIN ARE BELIEVED TO BE ACCURATE. HOWEVER, NO GUARANTEE OR WARRANTY, EXPRESSED OR IMPLIED IS GIVEN.

PREPARED BY: Angela Boggs
Corporate Environmental Health and Safety

118501

M A T E R I A L S A F E T Y D A T A S H E E T

Shipley Company Inc.
2300 Washington Street
Newton, Massachusetts 02162
Emergency Phone: (617) 969-5500

EFFECTIVE DATE: 15 November 1985

PRODUCT NAME: MICROPOSIT® 352 DEVELOPER

PRODUCT CLASS: Developer

SECTION I - HAZARDOUS COMPONENTS

COMPONENT	CAS NO.	PERCENT	TLV mg/m^3	CARCINOGEN STATUS
Sodium Hydroxide	1310-73-2	3	2	N.A.

Proprietary ingredients, including water, not deemed hazardous per OSHA Hazard Communication Standard.

SECTION II - PHYSICAL DATA

BOILING POINT: > 212°F
VAPOR PRESSURE (mmHg): N.A.
% VOLATILE BY VOL: N.A.
EVAPORATION RATE: N.A.
VAPOR DENSITY(AIR=1): N.A.
SPECIFIC GRAVITY: Approx. 1.0-1.1
SOLUBILITY IN WATER: Complete
pH: > 12
APPEARANCE AND ODOR: Water white liquid with no noticeable odor.

SECTION III - PHYSICAL HAZARDS

DOT PROPER SHIPPING NAME: Sodium Hydroxide Solution
DOT HAZARD CLASSIFICATION: Corrosive Material
DOT HAZARD IDENTIFICATION NUMBER: UN1824

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: Non-flammable METHOD USED: N.A.
EXTINGUISHING MEDIA: Water, carbon dioxide, dry chemicals
SPECIAL FIRE FIGHTING PROCEDURES: None
UNUSUAL FIRE AND EXPLOSION HAZARDS: None known

REACTIVITY DATA

STABILITY: Stable
CONDITIONS TO AVOID: None known
INCOMPATIBILITY: Acids
DECOMPOSITION PRODUCTS: Neutralization produces heat.
HAZARDOUS POLYMERIZATION: Will not occur.

M A T E R I A L S A F E T Y D A T A S H E E T
Shipley Company Inc, Newton, Massachusetts 02162
Emergency Phone: (617) 969-5500
MICROPOSIT® 352 DEVELOPER

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ROUTES OF ENTRY: Inhalation of mist, ingestion, eye and skin contact.
ACUTE EFFECTS: Contact with eyes may cause irritation or burns. Contact with skin and mucous membranes may cause irritation.
CHRONIC EFFECTS: None known.

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EYE CONTACT: Flush with water immediately for at least 15 minutes, then contact a physician.
SKIN CONTACT: Flush skin with plenty of water. Contact a physician if irritation persists.
INHALATION: Move to fresh air.

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EYE PROTECTION: Chemical goggles.
PROTECTIVE CLOTHING: Chemical gloves and suitable protective clothing to prevent skin contact.
WORK PRACTICES: Avoid skin contact. Practice good personal hygiene to prevent accidental exposure.

SECTION VIII - SPECIAL PRECAUTIONS AND ADDITIONAL INFORMATION

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: WARNING! Corrosive liquid. Treat as a dilute alkaline solution. Store in closed original container in a cool, dry area at 50-90°F. Keep away from acids. Do not store in direct sunlight.

N.A. Denotes no applicable information was found.

THE INFORMATION AND RECOMMENDATIONS CONTAINED HEREIN ARE BELIEVED TO BE ACCURATE. HOWEVER, NO GUARANTEE OR WARRANTY, EXPRESSED OR IMPLIED IS GIVEN.

PREPARED BY: Angela Boggs
Corporate Environmental Health and Safety

Form Approved
OMB No. 44-R1387

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME: Shipley Company Inc.	EMERGENCY TELEPHONE NO.: (617) 969-5500
ADDRESS (Number, Street, City, State, and ZIP Code): 2300 Washington Street, Newton, Massachusetts 02162	
CHEMICAL NAME AND SYNONYMS: n.a.	TRADE NAME AND SYNONYMS: MLB CONDITIONER 217
CHEMICAL FAMILY	FORMULA

SECTION II HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS n.a.			BASE METAL n.a.		
CATALYST n.a.			ALLOYS n.a.		
VEHICLE n.a.			METALLIC COATINGS n.a.		
SOLVENTS glycol ethers	50	50 ppm	FILLER METAL PLUS COATING OR CORE FLUX n.a.		
ADDITIVES n.a.			OTHERS n.a.		
OTHERS n.a.					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Ethanolamine	10	3 ppm

SECTION III PHYSICAL DATA

BOILING POINT (°F.) (> 100°C)	> 212°F	SPECIFIC GRAVITY (H_2O=1)	~0.99
VAPOR PRESSURE (mm Hg.)	n.a.	PERCENT VOLATILE BY VOLUME (%)	n.a.
VAPOR DENSITY (AIR=1)	n.a.	EVAPORATION RATE (Butyl Acetate = 1	< 1
SOLUBILITY IN WATER	complete	pH	~ 12
APPEARANCE AND ODOR	A pale yellow liquid with an "organic" odor.		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) Tested to 210°F with no flash point	FLAMMABLE LIMITS	Lel: unknown	Uel: unknown
EXTINGUISHING MEDIA: Water, CO_2, Dry Chemical			
SPECIAL FIRE FIGHTING PROCEDURES: None			
UNUSUAL FIRE AND EXPLOSION HAZARDS: Excessive heat may cause combustible vapors to be evolved.			

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: n.a. - See Section II

EFFECTS OF OVEREXPOSURE: As for Glycol Ethers and Ethanolamine

EMERGENCY AND FIRST AID PROCEDURES: Swallowing: Contact physician immediately; Eye Contact: Flush with copious amounts of water - contact physician; Skin Contact: Flush with copious amounts of water; Inhalation: Move to fresh air.

SECTION VI REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	

INCOMPATABILITY *(Materials to avoid)*: Strong Oxidants

HAZARDOUS DECOMPOSITION PRODUCTS: Unknown

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR		

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Flush area with cold water

WASTE DISPOSAL METHOD: Contact Shipley Product Services Department

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*: n.a.

VENTILATION	MECHANICAL *(General)*: Local Exhaust Recommended	SPECIAL
		OTHER

PROTECTIVE GLOVES: Yes

EYE PROTECTION: Yes

OTHER PROTECTIVE EQUIPMENT: Suitable protective clothing

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Treat as an alkaline cleaner. Store in a dry area, away from strong oxidants, at 50-90°F. Do not store in direct sunlight. Keep sealed when not in use.

OTHER PRECAUTIONS:

MATERIAL SAFETY DATA SHEET

(R) CDG 11/16/84

CODE 10207

SECTION 1

Manufacturer's Name MacDermid Incorporated	EMERGENCY TELEPHONE 203-575-5700
ADDRESS (Number, Street, City, State, Zip Code) 526 Huntingdon Avenue Waterbury, CT. 06708	MFSA EMERGENCY 24 HOUR HOTLINE: (313) - 644 - 5626
CFR-49 - DOT Proper Shipping Name Sodium Hydroxide, Dry Solid, Mixture Corrosive Material UN1823	
CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNOMYM Anodex 61-XU
CHEMICAL FAMILY	FORMULA Mixture

SECTION II - HAZARDOUS INGREDIENTS

	%	TLV (UNITS)		%	TLV (UNITS)
PAINTS, PRESERVATIVE & SOLVENTS	N/A		ALLOYS & METALLIC COATINGS	N/A	
PIGMENTS	"		BASE METAL	"	
CATALYST	"		ALLOYS	"	
VEHICLE	"		METALLIC COATINGS	"	
SOLVENTS	"		FILLER METAL PLUS OR CORE FLUX	"	
ADDITIVES	"		OTHERS	"	
OTHERS	"				

HAZARDOUS MIXTURES OR OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (UNITS)
Sodium Hydroxide (1310-73-2)	< 60	2mg/M^3

SECTION III - PHYSICAL DATA

BOILING POINT (F)	N/A	SPECIFIC GRAVITY (H_2O = 1)	N/A
VAPOR PRESSURE (MM. HG.)	"	PERCENT VOLATILE BY VOLUME (%)	"
VAPOR DENSITY (AIR = 1)	"	EVAPORATION RATE (= 1)	"
SOLUBILITY IN WATER	Appreciable		

APPEARANCE AND ODOR
White powder

SECTION IV = FIRE AND EXPLOSION HAZARD DATE

		LEL	UEL
FLASH POINT (METHOD USED) N/A	FLAMMABLE LIMITS N/A		
EXTINGUISHING MEDIA CO_2, foam			
SPECIAL FIRE FIGHTING PROCEDURES Wear self-contained breathing apparatus.			
UNUSUAL FIRE AND EXPLOSION HAZARDS Exothermic reaction when brought in contact with water.			

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

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MATERIAL SAFETY DATA SHEET

1406

SECTION I

MANUFACTURER'S NAME: Shipley Company Inc.	EMERGENCY TELEPHONE NO.: (617) 969-5500
ADDRESS (Number, Street, City, State and ZIP Code): 2300 Washington Street, Newton, Massachusetts 02162	
CHEMICAL NAME AND SYNONYMS: n.a.	TRADE NAME AND SYNONYMS: NEUTRA-ETCH V-1
CHEMICAL FAMILY: n.a.	FORMULA: Proprietary

SECTION II HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS n.a.			BASE METAL n.a.		
CATALYST n.a.			ALLOYS n.a.		
VEHICLE n.a.			METALLIC COATINGS n.a.		
SOLVENTS n.a.			FILLER METAL PLUS COATING OR CORE FLUX n.a.		
ADDITIVES n.a.			OTHERS n.a.		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Copper (dissolved)	5	1 mg/M^3
Ammonia	0.5	50 ppm
Ethanolamine	15	3 ppm
Ammonium Nitrate	15	Unknown

SECTION III PHYSICAL DATA

BOILING POINT (°F.) (> 100°C)	> 212°F	SPECIFIC GRAVITY (H_2O=1)	~1.17
VAPOR PRESSURE (mm Hg.)	n.a.	PERCENT VOLATILE BY VOLUME (%) Water based solution	n.a.
VAPOR DENSITY (AIR=1)	n.a.	EVAPORATION RATE (_____=1)	n.a.
SOLUBILITY IN WATER	Complete		

APPEARANCE AND ODOR: Blue liquid with ammoniacal odor

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used): Non-flammable	FLAMMABLE LIMITS	Lel: n.a.	Uel: n.a.

EXTINGUISHING MEDIA: Water, CO_2, Dry chemical

SPECIAL FIRE FIGHTING PROCEDURES: Check for presence of ammonia fumes and oxides of nitrogen.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Excessive heat (as in a fire or when heated to decomposition) may produce

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: n.a. - See Section II

EFFECTS OF OVEREXPOSURE: As for ammonia and ethanolamine

EMERGENCY AND FIRST AID PROCEDURES: Swallowing: Contact physician immediately; Eye Contact: Flush with copious amounts of water - contact physician; Skin Contact: Flush with copious amounts of water; Inhalation: Move to fresh air.

SECTION VI REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	None

INCOMPATABILITY *(Materials to avoid)*: Reducing agents

HAZARDOUS DECOMPOSITION PRODUCTS: When exposed to heat, ammonium compounds emit toxic fumes

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	None

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Flush area with cold water

WASTE DISPOSAL METHOD: Contact Shipley Product Services Department

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*: n.a.

VENTILATION	LOCAL EXHAUST: Recommended	SPECIAL
	MECHANICAL *(General)*	OTHER

PROTECTIVE GLOVES: Yes

EYE PROTECTION: Yes

OTHER PROTECTIVE EQUIPMENT: Suitable protective clothing

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Treat as a dilute solution of copper salts containing ammonium compounds (pH approx. 7.8)

Store in a dry area at 50-90F. Do not store in direct sunlight. Keep sealed when not in use.

OTHER PRECAUTIONS

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

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OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

1407

SECTION I

MANUFACTURER'S NAME: Shipley Company Inc.	EMERGENCY TELEPHONE NO.: (617) 969-5500
ADDRESS (Number, Street, City, State, and ZIP Code): 2300 Washington Street, Newton, Massachusetts 02162	
CHEMICAL NAME AND SYNONYMS: (n.a.)	TRADE NAME AND SYNONYMS: NEUTRA-ETCH V-2
CHEMICAL FAMILY: n.a.	FORMULA: Proprietary

SECTION II HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS: n.a.			BASE METAL: n.a.		
CATALYST: n.a.			ALLOYS: n.a.		
VEHICLE: n.a.			METALLIC COATINGS: n.a.		
SOLVENTS: n.a.			FILLER METAL PLUS COATING OR CORE FLUX: n.a.		
ADDITIVES: n.a.			OTHERS: n.a.		
OTHERS: n.a.					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Ammonia	0.5	50 ppm
Ethanolamine	15	3 ppm
Ammonium Nitrate	15	Unknown

SECTION III PHYSICAL DATA

BOILING POINT (°F.) (> 100°C)	> 212°F	SPECIFIC GRAVITY (H_2O=1)	~1.14
VAPOR PRESSURE (mm Hg.)	n.a.	PERCENT VOLATILE BY VOLUME (%) water based solution	n.a.
VAPOR DENSITY (AIR=1)	n.a.	EVAPORATION RATE (_____=1)	n.a.
SOLUBILITY IN WATER	complete		
APPEARANCE AND ODOR	Light yellow liquid with ammoniacal odor		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used): Non-Flammable	FLAMMABLE LIMITS	Lel: n.a.	Uel: n.a.

EXTINGUISHING MEDIA: Water, CO_2, Dry Chemical

SPECIAL FIRE FIGHTING PROCEDURES: Check for presence of ammonia fumes and oxides of nitrogen.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Excessive heating (as in a fire or when heated to decomposition) may produce unusual fire and explosion hazards.

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: n.a. - See Section II

EFFECTS OF OVEREXPOSURE: As for ammonia and ethanolamine

EMERGENCY AND FIRST AID PROCEDURES
Swallowing: Contact physician immediately; Eye Contact: Flush with copious amount of water - contact physician; Skin Contact: Flush with copious amounts of water; Inhalation: Move to fresh air.

SECTION VI REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	None

INCOMPATABILITY *(Materials to avoid)*: Reducing agents

HAZARDOUS DECOMPOSITION PRODUCTS: When exposed to heat, ammonium compounds emit toxic fumes

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	None

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Flush area with cold water

WASTE DISPOSAL METHOD: Contact Shipley Product Services Department

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*: n.a.

VENTILATION	LOCAL EXHAUST: Recommended	SPECIAL
	MECHANICAL *(General)*	OTHER

PROTECTIVE GLOVES: Yes

EYE PROTECTION: Yes

OTHER PROTECTIVE EQUIPMENT: Suitable protective clothing

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Treat as a dilute aqueous solution containing ammonium compounds (pH approx. 8.0). Store in a dry area at 50-90°F. Do not store in direct sunlight. Keep sealed when not in use.

NEUTRA-ETCH V-2

Rejuvenator Solution

patents pending

USE

NEUTRA-ETCH V-2 is used for replenishment of NEUTRA-ETCH V-1 solutions and will maintain the properties of the etchant throughout its useful life.

When replenished and operated according to instructions the NEUTRA-ETCH bath will provide:

- Constant controlled etch rate
- Long pot-life
- Excellent yield
- Compatibility with most commonly used metallic and organic etch resists.

OPERATION

When a NEUTRA-ETCH V-1 bath is "spent", simply remove about two thirds of the bath volume then restore to full bath volume by adding NEUTRA-ETCH V-2. Do not add the NEUTRA-ETCH V-2 to maintain volume level during operation as the solution can become over-concentrated. After volume level has been restored, adjust pH as necessary with ammonium hydroxide to between 7.5 to 7.8. Do not allow pH to drop below 7.5.

During operation, only volume adjustment with water and normal pH maintenance is required.

For a continuous 24-hour operation, consult the Shipley Technical Service Department for instructions.

EQUIPMENT

NEUTRA-ETCH V-2 will not affect spray etching equipment normally used in the industry. No additional venting is required nor recommended.

SAFE HANDLING

Normal safety precautions should be taken as in the handling of chemicals. Use safety glasses, gloves, and clothing. If skin contact occurs, wash exposed area with copious amounts of water.

STORAGE

Store in a dry area between 50° to 90°F. Keep sealed when not in use. Avoid freezing.

August 1971

D V-2

SHIPLEY COMPANY INC.

2300 Washington St., Newton, Mass. 02162 • (617) 969-5500 727 East 223rd St., Carson Calif. 90745 • (213) 775-7181

MATERIAL SAFETY DATA SHEET (MSDS)
SC-000-016 REV. 1 DATE 11/22/85 CODE 06-04
CONFORMS TO REQUIREMENTS OF OSHA STANDARD 1910.1200
"HAZARD COMMUNICATION" AND TO VARIOUS STATE
"EMPLOYEE RIGHT TO KNOW" LAWS

SECTION I PRODUCT IDENTIFICATION

This MSDS supplied for: Nickel Alloyed

ASTM No.	ACI alloy designation (Grades)
A128/A128M-84	D
A217/A217M-84	WC4
A352/A352M-84	LC2, LC2-1, LC3, LC4, LC9
A487/A487M-84	10N, 11N, 12N, 13N, 16N, 7Q, 10Q, 11Q, 12Q, 13Q, 14Q
A732/A732M-84	9Q, 10Q, 11Q
A757/A757M-84	B2N, B2Q, B3N, B3Q, B4N, B4Q, C1Q
MIL-S-870B (SHIPS)	
MIL-S-23008C	HY-80, HY-100

VENDOR NAME AND ADDRESS:

HITCHINER
MANUFACTURING CO., INC.
[illegible] NEW HAMPSHIRE 03055
TELEPHONE 603-673-1[illegible] TWX 710-366-1863
TELEX 95-3014 CABLE ADDRESS HITCHINER

EMERGENCY PHONE NUMBER:

FIRE HAZARD CLASS: HEALTH: 0 FLAMMABILITY: 0 REACTIVITY: 0
THE FOURTH DIAMOND:
ANSI: WARNING! WELDING, CUTTING, OR GRINDING ON THIS CASTING WILL GENERATE TOXIC DUST OR FUMES.

SECTION II - HAZARDOUS COMPONENTS

INGREDIENT	CAS NO.	PERCENT	TLV	PEL
oron		0.002-0.006		
as boron oxide)	1303-86-2		10 mg/cu.m	15 mg/cu.m
Carbon	7440-44-0	0.12-1.3	N/E	N/E
Chromium	7440-47-3	0-1.85	0.5 mg/cu.m	1 mg/cu.m
Copper (As dust)	7440-50-8	0-0.50	1.0 mg/cu.m	1.0 mg/cu.m
(As fume)			0.2 mg/cu.m	0.1 mg/cu.m
Iron	7439-89-6	balance		
(as iron oxide fume)	1309-37-1		5 mg/cu.m	10 mg/cu.m

N/E means none established. N/A means not applicable.
N/D means no data available.

INGREDIENT	CAS NO.	PERCENT	TLV	PEL
Manganese (As dust)	7439-96-5	0.40-14.0	C 5 mg/cu.m	C 5 mg/cu.m
(As fume)			1 mg/cu.m	C 5 mg/cu.m
Molybdenum	7439-98-7	0-1.20	10 mg/cu.m	15 mg/cu.m
Nickel	7440-02-0	0-10.0	1 mg/cu.m	1 mg/cu.m
Phosphorus	7723-14-0	0.02-0.07	0.1 mg/cu.m	0.1 mg/cu.m
Silicon	7440-21-3	0.30-1.00	10 mg/cu.m (as nuisance dust)	15 mg/cu.m
Sulfur	7704-34-9	0-0.05	N/E	N/E
Titanium		0-0.02		
(as titanium dioxide)	13463-67-7		10 mg/cu.m	15 mg/cu.m
Tungsten	7440-33-7	0-0.10	5 mg/cu.m	N/E
Vanadium		0-0.10		
(as vanadium oxide)	1314-62-1			
(As dust)			0.05 mg/cu.m	0.5 mg/cu.m
(As fume)			0.05 mg/cu.m	0.1 mg/cu.m

C means ceiling limit. These are limits which should not be exceeded, even for a short time. All other are 8 hr Time-weighted average concentrations.

Elements having a listed percentage greater than zero will be present in all grades. Those having a value of "0" may not be present in certain grades. Refer to Steel Founders' Society of America "Steel Castings Handbook" Supplement 2 for specifications on a particular ASTM alloy and grade.

SECTION III - OVERVIEW

There are no chemical hazards from these castings in solid form at room temperature.

Dust or fumes are generated by machining, grinding, or welding on these castings. Since the castings contain a high percentage of iron, most of the dust or fume will be iron or iron oxide. There is no TLV for iron dust, but available information indicates that a concentration of 10 mg/cu.m., as if it were a nuisance dust, will serve as a guideline until a TLV is established.

Overexposure to iron oxide fume over a long time can cause siderosis, sometimes called "iron pigmentation" of the lung. It can be seen on a chest x-ray but causes little or no disability. Also see the Material Safety Data Sheet for the welding rod being used.

Since these castings contain up to 10 percent nickel, airborne contaminants from machining or welding will contain nickel dust or fume. If total welding fume is adequately controlled, nickel will also be controlled.

Some forms of nickel have been found to cause cancer in animals. One form, nickel subsulfide, which was present in an old smelting process no longer used, apparently caused nasal cancer in humans. Since then, studies have shown that the potential for ordinary forms of nickel and its oxides to cause cancer in humans is very

Some grades contain manganese. Long-term overexposure to manganese dust or fume can cause manganese poisoning. If welding or flame cutting fume is controlled to the TLV for total fume, the manganese fume will be adequately controlled.

Grinding on castings that have not been cleaned or that contain embedded sand may generate significant amounts of dust containing free silica, which can cause silicosis. The use of ventilation for control of metal dust and fume will also control airborne silica.

Boron, carbon, chromium, copper, molybdenum, phosphorus, silicon, sulfur, titanium, tungsten, and vanadium are also contained in the castings in low amounts. Overexposure to these would not be likely. If the airborne concentration of nickel is controlled below its TLV and PEL, these minor constituents would also be adequately controlled.

SECTION IV - PHYSICAL DATA

PHYSICAL DESCRIPTION: Solid, silver gray in color, no odor
BOILING POINT: variable depending on casting grade
VAPOR PRESSURE: N/A
VAPOR DENSITY: N/A
SOLUBILITY IN WATER: N/A
SPECIFIC GRAVITY: 7.86 for iron
PERCENT VOLATILE BY VOLUME: N/A
EVAPORATION RATE: N/A

SECTION V - FIRE AND EXPLOSION DATA

Castings will not burn or explode.

SECTION VI - HEALTH HAZARD DATA

EYES: Metal particles in the eyes may cause irritation if not removed.
SKIN: None known.
BREATHING: Breathing high concentrations of nickel dust or fume may cause deep lung irritation. Some forms of nickel can cause cancer; refer to the Overview of this MSDS.
Breathing excessive amounts of silica dust for a long time can cause silicosis. Silicosis causes shortness of breath, reduced capacity to do work, and weakens the defenses against other lung diseases.
SWALLOWING: N/A
NOISE: Grinding or machining castings is noisy. The OSHA limit for noise averaged over 8 hours is 90 decibels (dBA), hearing conservation program required if exposure is over 85 dBA. If noise is at or above 90 dBA you should wear ear muffs or ear plugs.

==========

N/E means none established. N/A means not applicable.
N/D means no data available.

========== FIRST AID ==========

IF IN EYES: Metal particles should be removed by trained individuals such as a nurse or physician.
IF ON SKIN: N/A
IF BREATHED: (Fumes from welding): Move to fresh air.
IF SWALLOWED: N/A

SECTION VII - REACTIVITY DATA

HAZARDOUS POLYMERIZATION: Will not occur.
STABILITY: Stable.
INCOMPATIBILITY: Iron may cause violent decoposition of hydrogen peroxide (52%) by weight or greater.

SECTION VIII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

If damaged, return castings to vendor or send to scrap reclaimer.

Collected dust from machining, welding, etc. may be classed as a "hazardous waste" depending on circumstances. Consult local authorities regarding disposal.

SECTION IX - PROTECTIVE EQUIPMENT TO BE USED

RESPIRATORY PROTECTION: Wear a NIOSH approved respirator for dusts or fume if concentrations exceed the TLV or PEL.
VENTILATION: Provide general ventilation and/or local exhaust if necessary to maintain concentrations below the TLVs.
PROTECTIVE GLOVES: Work gloves advisable for handling castings.
EYE PROTECTION: Safety glasses with side shields and/or face shields for particles (grinding). Welding goggles or helmet for welding.
OTHER PROTECTIVE EQUIPMENT: Wear a protective apron and gauntlets if arc-air gouging or cutting, or welding on castings.
If noise is at or above 90 dBA you should wear ear muffs or ear plugs.

SECTION X - SPECIAL PRECAUTIONS OR OTHER COMMENTS

STORAGE: No special precautions.

INFORMATION PRESENTED HEREIN HAS BEEN COMPILED FROM SOURCES CONSIDERED TO BE RELIABLE AND IS ACCURATE AND RELIABLE TO THE BEST OF OUR KNOWLEDGE AND BELIEF BUT IS NOT GUARANTEED TO BE SO.

MAR 1986

4742

UNIVERSAL
MATERIAL SAFETY DATA SHEET

Chemical Family	Metal	Boiling Point	2732 f
Trade Name	Nickel Plating	Vapor pressure	None @ 70 f
Formula	Ni	Specific Gr.	8.90

Appearance & Odor Pale White metal, No odor

HEALTH HAZARD DATA

Metal fume fever, Dermatitis, carcinoma of sinus and or lungs after chronic exposure to dust or fumes.
After acute exposure remove victim to fresh air and get medical help.

Threshold Limit Value 1 mg/m^3 as fume or dust.

PERSONAL PROTECTION EQUIPMENT

OSHA approved respirator for dust, mist and fumes as applicable. Use of local exhaust is recommended for hot operations. Use of gloves, aprons, and safety glasses when handling materials is required.

REACTIVITY

Polishing or grinding dust may be explosive under certain conditions. Avoid contact with Fluorine,ammonium nitrate, hydrazine, and acids.

DISPOSAL, SPECIAL PRECAUTIONS

Where quantities warrant, store for possible reclamation. After working with coated materials, wash hands and face before eating, drinking or smoking.

Characteristics not covered on this MSDS are not applicable to this material at this time.

Elk Grove Plating Co., Inc.

MAR 1986

4130

Nickel Alloy

PRODUCT NAME

Comtra No. SC-000-016

Refer to Material Safety Data Sheet for more information.

MANUFACTURER

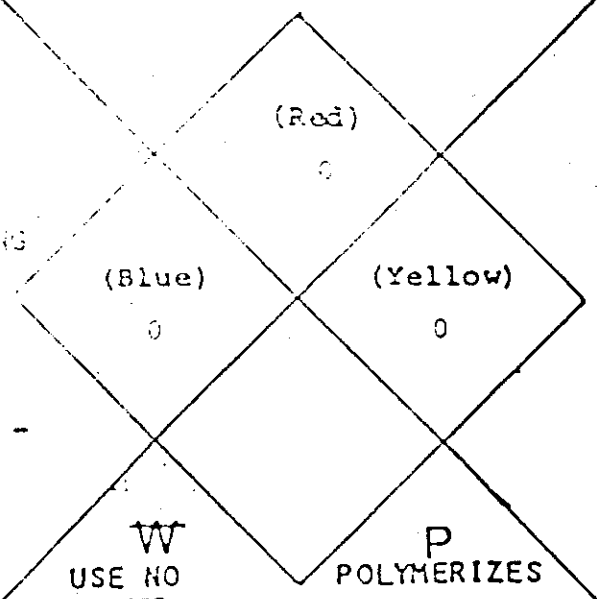
HITCHINER
MANUFACTURING CO., INC.
MILFORD, NEW HAMPSHIRE 03055

FIRE HAZARD

4. EXTREMELY DANGEROUS FIRE AND EXPLOSION HAZARD
3. FIRE AND EXPLOSION HAZARD AT NORMAL TEMP
2. WILL BURN AT TEMPS ABOVE 100 F
1. WILL BURN AT TEMPS ABOVE 200 F
0. WILL NOT BURN

HEALTH HAZARD

4. EXTREME HAZARD - AVOID CONTACT OR BREATHING VAPOR
3. SEVERE HAZARD - USE SPECIAL CLOTHING AND MASKS
2. HAZARDOUS - USE MASKS OR SPECIAL VENTILATION
1. SLIGHTLY HAZARDOUS - IRRITATING
0. NORMAL MATERIAL



REACTIVITY HAZARD

4. EXTREME HAZARD - VACATE AREA IN CASE OF FIRE
3. SEVERE EXPLOSION HAZARD
2. VIOLENT CHEMICAL CHANGE POSSIBLE
1. UNSTABLE IF HEATED
0. NORMALLY STABLE

ANSI: WARNING! WELDING, CUTTING OR GRINDING ON THIS CASTING WILL GENERATE TOXIC DUST OR FUMES.

INGREDIENTS (PERCENT)

Iron	Balance
Manganese	0.40 - 14.0
Nickel	0 - 10.0

See Material Safety Data Sheet for a listing of minor ingredients.

STORAGE AND HANDLING

No Special Precautions

Fisher Scientific Company

2486

Chemical Manufacturing Division
P. O. Box 375, 1 Reagent Lane
Lawn, NJ 07410

MATERIAL SAFETY DATA SHEET (Adapted from USDL From LSD-005-4) (201) 796-7100

SECTION I. IDENTIFICATION OF PRODUCT

MIC NAME	FORMULA
Nickel(ous) Chloride,	$NiCl_2.6H_2O$

ONYM OR CROSS REFERENCE

SECTION II. HAZARDOUS INGREDIENTS

ERIAL	NATURE OF HAZARD

SECTION III. PHYSICAL DATA

ING POINT	MELTING POINT
NA	sublimes
OR PRESSURE(mm Hg) NA	SPECIFIC GRAVITY unknown
SITY (AIR = 1) NA	PERCENT VOLATILE BY VOLUME (%) NA
EH SOLUBILITY 260g	EVAPORATION RATE (= 1) NA

EARANCE Light-green crystals

SECTION IV. FIRE AND EXPOSION HAZARD DATA

SH POINT (method used)	FLAMMABLE LIMITS	Uel	Lel
NA	NA		

E EXTINGUISHING MEDIA

CIAL FIRE-FIGHTING PROCEDURES Wear self-contained breathing apparatus.

USUAL FIRE AND EXPLOSION HAZARD When heated to decomposition, emits toxic fumes of chloride.

SECTION V. HEALTH HAZARD

RESHOLD LIMIT VALUE $0.1mg/m^3$ (Ni)

ZARDS Avoid breathing dust.

AID PROCEDURES

SECTION VI. REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		
	STABLE	X	

INCOMPATIBILITY (material to avoid)

HAZARDOUS DECOMPOSITION PRODUCTS
When heated to decomposition, emits toxic fumes of chlorides.

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII. SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Scoop up and place in a suitable container.

WASTE DISPOSAL METHOD

DISPOSE OF BY MEANS AS TO COMPLY WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS OR CONTACT AN APPROVED AND LICENSED DISPOSAL AGENCY.

SECTION VIII. PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)

dust mask

VENTILATION		
None required	LOCAL	SPECIAL
	MECHANICAL (general)	OTHER

PROTECTIVE GLOVES	EYE PROTECTION
none	safety glasses

OTHER PROTECTIVE EQUIPMENT

SECTION IX. HANDLING AND STORAGE PRECAUTIONS

STORAGE AND HANDLING

Keep well closed

SECTION X. MISCELLANEOUS INFORMATION

INFORMATION FURNISHED BY:	TITLE
Gaston L. Pillori	Manager of Quality Assurance

The above information is believed to be accurate and represents the best information currently available to us. However, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.

REV. NO. 0 DATE: May 23, 1980

Form No 11-79

J.T.Baker
222 Red School Lane Phillipsburg, N.J. 08865
24-Hour Emergency Telephone -- (201) 859-2151
Chemtrec # (800) 424-9300
National Response Center # (800) 424-8802

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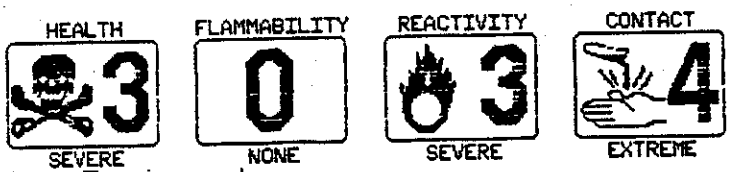
MATERIAL SAFETY DATA SHEET

SECTION I - PRODUCT IDENTIFICATION

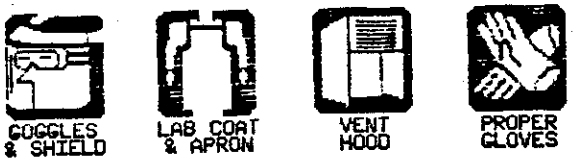
Product Name: Nitric Acid
Formula: HNO_3
Formula Wt: 63.01
CAS No.: 7697-37-2
NIOSH/RTECS No.: QU5775000
Common Synonyms: (Hydrogen Nitrate; Azotic Acid)
Product Codes: 4801,9605,9602,9598,9606,9601,5371,9597,9600,5113,9616

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA™ System



Laboratory Protective Equipment



Precautionary Label Statements

POISON! DANGER!
STRONG OXIDIZER - CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE
LIQUID AND VAPOR CAUSE SEVERE BURNS - MAY BE FATAL IF SWALLOWED
HARMFUL IF INHALED AND MAY CAUSE DELAYED LUNG INJURY
SPILLAGE MAY CAUSE FIRE OR LIBERATE DANGEROUS GAS

Keep from contact with clothing and other combustible materials. Do not store near combustible materials. Do not get in eyes, on skin, on clothing. Do not breathe vapor. Keep in tightly closed container. Use with adequate ventilation. In case of fire, use water spray, alcohol foam, dry chemical, or carbon dioxide. Flush spill area with waterspray.

SECTION II - HAZARDOUS COMPONENTS

Component	%	CAS No.
Nitric Acid	65-75	7697-37-2

Continued on Page: 2

SECTION III - PHYSICAL DATA

oiling Point: 121°C (250°F)

elting Point: -42°C (-44°F)

pecific Gravity: 1.41
(H2O=1)

lubility(H_2O): Complete (in all proportions)

pearance & Odor: Colorless liquid, with choking odor.

Vapor Pressure(mmHg): 9

Vapor Density(air=1): N/A

Evaporation Rate: N/A
(Butyl Acetate=1)

% Volatiles by Volume: 100

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

ash Point: N/A

NFPA 704M Rating: 3-0-0 OXY

ammable Limits: Upper - N/A % Lower - N/A %

tinguishing Media
Use water spray.

cial Fire-Fighting Procedures
Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode. Move exposed containers from fire area if it can be done without risk. Use water to keep fire-exposed containers cool; do not get water inside containers.

sual Fire & Explosion Hazards
Strong oxidizer. Contact with other material may cause fire.

ases Produced
nitrogen oxides, hydrogen gas

SECTION V - HEALTH HAZARD DATA

shold Limit Value (TLV/TWA): 5 mg/m^3 (2 ppm)

t-Term Exposure Limit (STEL): 10 mg/m^3 (4 ppm)

ible Exposure Limit (PEL): 5 mg/m^3 (2 ppm)

inogenicity: NTP: No IARC: No Z List: No OSHA reg: No

cts of Overexposure
Inhalation of vapors may cause nausea, vomiting, lightheadedness or

SECTION V - HEALTH HAZARD DATA (Continued)

headache.
Inhalation of vapors may cause severe irritation of the respiratory system.
Inhalation of vapors may cause coughing, chest pains, difficulty breathing, or unconsciousness.
Contact with liquid or vapor may cause severe irritation or burns of the skin, eyes, and mucous membranes.
Ingestion may cause severe burns to mouth, throat, and stomach. May have adverse effect on kidney function and may be fatal.
Ingestion is harmful and may be fatal.

Medical Conditions Generally Aggravated By Exposure
damaged skin, eye disorders, cardiopulmonary disease

Routes Of Entry
inhalation, ingestion, eye contact, skin contact

Emergency and First Aid Procedures
CALL A PHYSICIAN.
If swallowed, do NOT induce vomiting; if conscious, give water, milk, or milk of magnesia.
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Wash clothing before re-use.

SECTION VI - REACTIVITY DATA

Stability: Stable Hazardous Polymerization: Will not occur

Conditions to Avoid: heat, light, moisture

Incompatibles: strong bases, combustible materials, strong reducing agents, alkalies, most common metals, organic materials, alcohols, carbides

Decomposition Products: oxides of nitrogen, hydrogen

SECTION VII - SPILL AND DISPOSAL PROCEDURES

Steps to be taken in the event of a spill or discharge
Wear self-contained breathing apparatus and full protective clothing. Stop leak if you can do so without risk. Ventilate area. Neutralize spill with soda ash or lime. With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water. Keep combustibles (wood, paper, oil, etc.) away from spilled material.

J. T. Baker Neutrasorb® or Neutrasol® "Low Na+" acid neutralizers

SECTION VII - SPILL AND DISPOSAL PROCEDURES (Continued)

are recommended for spills of this product.

Disposal Procedure

Dispose in accordance with all applicable federal, state, and local environmental regulations.

EPA Hazardous Waste Number: D001, D002 (Ignitable, Corrosive Waste)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

Ventilation:	Use general or local exhaust ventilation to meet TLV requirements.
Respiratory Protection:	Respiratory protection required if airborne concentration exceeds TLV. At concentrations up to 100 ppm, a chemical cartridge respirator with acid cartridge is recommended. Above this level, a self-contained breathing apparatus is advised.
Eye/Skin Protection:	Safety goggles and face shield, uniform, protective suit, acid-resistant gloves are recommended.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

AF-T-DATA™ Storage Color Code: Yellow (reactive)

Special Precautions

Keep container tightly closed. Store separately and away from flammable and combustible materials.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

Proper Shipping Name	Nitric acid (over 40%) Poison - Inhalation Hazard
Hazard Class	Oxidizer
ID/NA	UN2031
Label	OXIDIZER, CORROSIVE, POISON
Reportable Quantity	1000 LBS.

INTERNATIONAL (I.M.O.)

Proper Shipping Name	Nitric acid
Hazard Class	8
ID/NA	UN2031
Labels	CORROSIVE

N/A = Not Applicable or Not Available

The information published in this Material Safety Data Sheet has been compiled from our experience and data presented in various technical publications. It is the user's responsibility to determine the suitability of this information for the adoption of necessary safety precautions. We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available. J. T. Baker makes no warranty or representation about the accuracy or completeness nor fitness for purpose of the information contained herein.

MATERIAL SAFETY DATA SHEET

J.T.Baker CHEMICALS

J. T. Baker Chemical Co., 222 Red School Lane, Phillipsburg, N.J. 08865

CHEMICAL NAME

SECTION I . IDENTIFICATION OF PRODUCT

CHEMICAL NAME	FORMULA
Nitric Acid	HNO_3
SYNONYM OR CROSS REFERENCE	CAS NO: EPA NO:

SECTION II . HAZARDOUS INGREDIENTS

MATERIAL	NATURE OF HAZARD

SECTION III . PHYSICAL DATA

BOILING POINT approx. 244 to 251°F.	MELTING POINT
VAPOR PRESSURE @ 68°F. (approx.) 3.0	SPECIFIC GRAVITY 1.41
VAPOR DENSITY (AIR=1) 3.2	PERCENT VOLATILE BY VOLUME (%) 100%
WATER SOLUBILITY Complete	EVAPORATION RATE (Butyl Acetate = 1) ~1

APPEARANCE Colorless to light yellow (exposed to light) liquid with an acrid odor.

SECTION IV . FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (method used)	FLAMMABLE LIMITS	Lower	Upper
N.A.	N.A.		

FIRE EXTINGUISHING MEDIA Water spray

SPECIAL FIRE-FIGHTING PROCEDURES Avoid inhalation of poisonous gaseous oxides of nitrogen. Filter type respirators are unsuitable. Use self-contained or air supplied breathing apparatus approved by NIOSH

UNUSUAL FIRE AND EXPLOSION HAZARD Wood and other organics may ignite spontaneously or have greatly increased flammability. Can cause explosion with hydrogen sulfide, metallic powders, carbides and turpentine.

SECTION V . HEALTH HAZARD

THRESHOLD LIMIT VALUE 2 ppm by volume to 5 mg/M^3 18

HEALTH HAZARDS Will cause severe burns to skin or eyes. Inhalation of vapor or oxides of nitrogen is injurious to lungs. Symptoms may be delayed.

FIRST AID PROCEDURES In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Call a physician at once. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SECTION VI . REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	

INCOMPATABILITY (materials to avoid)

Fluorine, arsenic trioxide, phosphorous pentoxide, alkalies.

HAZARDOUS DECOMPOSITION PRODUCTS

HF gas evolution increases with temperature.

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII . SPILL AND DISPOSAL PROCEDURES

SPILLS

Flush immediately, neutralize carefully with soda ash or lime and again flush with water.

DISPOSAL

Contact a professional disposal service.

SECTION VIII . PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)
Self-contained breathing apparatus or supplied air (hose mask).

VENTILATION	LOCAL **Strong natural or forced draft or complete enclosure of material.**	SPECIAL
	MECHANICAL (general)	OTHER

PROTECTIVE GLOVES **Gauntlet-type, of neoprene, plasticized PVC or equivalent.**	EYE PROTECTION **Chemical safety goggles and face shield.**

OTHER PROTECTIVE EQUIPMENT
See (1) Below

SECTION IX . HANDLING AND STORAGE PRECAUTIONS

STORAGE & HANDLING **Store only in approved containers, avoid glass and some metals. Store below 125°F, preferably below 100°F., in well-ventilated area.**

SECTION X . MISCELLANEOUS INFORMATION

(1) Full coverage of body with clothing including hat at all times (not required with small quantities); also rubber shoes with soles of neoprene or equivalent. When exposure is probable, wear complete protective clothing and use an acid hood with plastic window.

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Date issued: 2/8/79

Approved by B. J. Lawlor
Manager, Quality Assurance

Revision No. & Date Issued: _____

chemists helping chemists in research & industry
aldrich chemical co.
P.O. Box 355, Milwaukee, Wisconsin 53201 USA

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TWX: (910) 262-3052 Aldrichem MI
Telex: 26 843 Aldrich MI
FAX: (414) 273-4979

ATTN: SAFETY DIRECTOR
AT&T BELL LABS
2000 NO NAPERVILLE RD
NAPERVILLE IL 60566
D. BRUCE BUHHOLZ ROOM 2E327

DATE: 11/08/88
CUST # 521469 P.O. #

M A T E R I A L S A F E T Y D A T A S H E E T

IDENTIFICATION

PRODUCT # 16140-3 NAME: MINERAL OIL (72ML = 6 X 12ML)
CAS # 8020-83-5

SYNONYMS
ADEPSINE OIL * ALBOLINE * BAYOL F * BLANDLUBE * CRYSTOL 325 * CRYSTOSOL * DRAKEOL * FONOLINE * GLYMOL * BAYOL 55 * KAYDOL * NUJOL * OIL MIST (ACGIH) * PARAFFIN OIL * PAROL * PAROLEINE * PENETECK * PENRECO * PERFECTA * PETROGALAR * PETROLATUM, LIQUID * PRIMOL 355 * PRIMOL D * PROTOPET * SAXOL * TECH PET F * WHITE MINERAL OIL *

TOXICITY HAZARDS

RTECS # PY8030000
MINERAL OIL
IRRITATION DATA
SKN-RBT 100 MG/24H MLD — CTOIDG 94(8),41,79
EYE-RBT 250 MG/5D MLD — AMIHAB 14,265,56
SKN-GPG 100 MG/24H MLD — CTOIDG 94(8),41,79
TOXICITY DATA
ORL-MUS LD50:22 GM/KG — ATXKA8 30,243,73
REVIEWS, STANDARDS, AND REGULATIONS
ACGIH TLV-TWA 5 MG/M3; STEL 10 MG/M3 85INA8 5,449,86
MSHA STANDARD-AIR:TWA 5 MG/M3 (PARTICULATE) DTLWS* 3,25,73
OSHA STANDARD-AIR:TWA 5 MG/M3 FEREAC 39,23540,74
EPA TSCA CHEMICAL INVENTORY, 1986
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, MARCH 1988
MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE FEREAC 47,30420, 82

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION

HEALTH HAZARD DATA

ACUTE EFFECTS
MAY BE HARMFUL BY INHALATION, INGESTION, OR SKIN ABSORPTION.
MAY CAUSE IRRITATION.
CHRONIC EFFECTS
DERMATITIS
LUNG IRRITATION
CHEMICAL PNEUMONITIS.
TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, AND TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.
FIRST AID
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES.
IN CASE OF CONTACT, IMMEDIATELY WASH SKIN WITH SOAP AND COPIOUS AMOUNTS OF WATER.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
CALL A PHYSICIAN.
WASH CONTAMINATED CLOTHING BEFORE REUSE.

Belgium
Aldrich Chemie N.V./S.A.
Bd. Lambermontlaan 140, b. 6
B-1030 Brussels
Telephone: (02) 2428750
Telex: 62302 Alchem B
FAX: (02) 242 82 16

France
Aldrich-Chimie S.a.r.l.
27, Fossé des Treize
F-67000 Strasbourg
Telephone: (88) 327010
Telex: 890076 Aldrich F
FAX: (88) 75 12 83

Japan
Aldrich Japan
Kyodo Bldg. Shinkanda
10 Kanda-Mikuracho
Chiyoda-Ku, Tokyo
Telephone: (03) 256-0155
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Aldrich Chemical Co., Ltd.
The Old Brickyard, New Road
Gillingham, Dorset SP8 4JL
Telephone: (07476) 2211
Telex: 417238 Aldrch G
FAX: (07476) 3779

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Aldrich-Chemie GmbH & Co. KG
D-7924 Steinheim
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FAX: (07329) 87-39

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TWX: (910) 262-3052 Aldrichem Mil
Telex: 26 843 Aldrich MI
FAX: (414) 273-4979

MATERIAL SAFETY DATA SHEET

CATALOG # 16140-3 NAME: MINERAL OIL (72ML = 6 X 12ML)

PHYSICAL DATA

SPECIFIC GRAVITY: 0.838

FIRE AND EXPLOSION HAZARD DATA

EXTINGUISHING MEDIA
WATER SPRAY.
CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
SPECIAL FIRE FIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
UNUSUAL FIRE AND EXPLOSION HAZARDS
NOT APPLICABLE

REACTIVITY DATA

INCOMPATIBILITIES
STRONG OXIDIZING AGENTS
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
TOXIC FUMES OF:
CARBON MONOXIDE, CARBON DIOXIDE

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
WEAR RESPIRATOR, CHEMICAL SAFETY GOGGLES, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
ABSORB ON SAND OR VERMICULITE AND PLACE IN CLOSED CONTAINERS FOR DISPOSAL.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
WASTE DISPOSAL METHOD
DISSOLVE OR MIX THE MATERIAL WITH A COMBUSTIBLE SOLVENT AND BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER.

OBSERVE ALL FEDERAL, STATE & LOCAL LAWS.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

CHEMICAL SAFETY GOGGLES.
RUBBER GLOVES.
NIOSH/MSHA-APPROVED RESPIRATOR.
SAFETY SHOWER AND EYE BATH.
MECHANICAL EXHAUST REQUIRED.
AVOID CONTACT AND INHALATION.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
WASH THOROUGHLY AFTER HANDLING.
KEEP TIGHTLY CLOSED.
STORE IN A COOL DRY PLACE.

ADDITIONAL PRECAUTIONS AND COMMENTS

NOT APPLICABLE

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

Belgium
Aldrich Chemie N.V./S.A.
Bd. Lambermontlaan 140, b. 6
B-1030 Brussels
Telephone: (02) 2426750
Telex: 62302 Alchem B
FAX: (02) 242 82 16

France
Aldrich-Chimie S.a.r.l.
27, Fossé des Treize
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Telephone: (88) 327010
Telex: 890076 Aldrich F
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10 Kanda-Mikuracho
Chiyoda-Ku, Tokyo
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United Kingdom
Aldrich Chemical Co., Ltd.
The Old Brickyard, New Road
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West Germany
Aldrich-Chemie GmbH & Co. KG
D-7924 Steinheim
Telephone: (07329) 87-0
Telex: 714838 Aldri D
FAX: (07329) 87-38

MATERIAL SAFETY DATA SHEET

J. T. Baker Chemical Co., 222 Red School Lane, Phillipsburg, N.J. 08865 323

SECTION I - IDENTIFICATION OF PRODUCT

CHEMICAL NAME	FORMULA
Oxalic Acid	$(COOH)_2 \cdot 2H_2O$
SYNONYM OR CROSS REFERENCE	CAS NO: 144-62-7
(Ethanedioic Acid)	

SECTION II - HAZARDOUS INGREDIENTS

MATERIAL	NATURE OF HAZARD

SECTION III - PHYSICAL DATA

BOILING POINT	MELTING POINT
157°C.	101.5°C.
VAPOR PRESSURE	SPECIFIC GRAVITY
VAPOR DENSITY (AIR=1)	PERCENT VOLATILE BY VOLUME (%)
WATER SOLUBILITY one gram dissolves in about 7 ml water	EVAPORATION RATE (_____= 1)

APPEARANCE
Monoclinic crystals

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (method used)	FLAMMABLE LIMITS	Lower	Upper

FIRE EXTINGUISHING MEDIA

SPECIAL FIRE-FIGHTING PROCEDURES

UNUSUAL FIRE AND EXPLOSION HAZARD
Corrosive

SECTION V - HEALTH HAZARD

THRESHOLD LIMIT VALUE
air: 1 mg/m³ scu-cat LDLO:112 mg/kg orl-dog LDLO: 1000 mg/kg

HEALTH HAZARDS
Poisonous! Causes burns. May be fatal if swallowed.

FIRST AID PROCEDURES In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Call a physician. If swallowed, if conscious, give lime water, large amount of powdered chalk in water or milk. Then induce vomiting. Repeat until vomit fluid is clear. Call a physician.

CHEMICAL NAME

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	

INCOMPATABILITY (materials to avoid)

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII - SPILL AND DISPOSAL PROCEDURES

SPILLS

Cover spill with soda ash or sodium bicarbonate. Mix and add water. Neutralize and wash down drain with sufficient water.

DISPOSAL

Dissolve in a flammable solvent and burn in a furnace with afterburner providing environmental regulations permit.

SECTION VIII - PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)
Chemical cartridge respirator; have self-contained breathing apparatus available

VENTILATION	LOCAL Preferable	SPECIAL
	MECHANICAL (general)	OTHER

PROTECTIVE GLOVES Rubber gloves	EYE PROTECTION Safety glasses

OTHER PROTECTIVE EQUIPMENT
Approved working clothes, safety shower, eyebath

SECTION IX - HANDLING AND STORAGE PRECAUTIONS

STORAGE & HANDLING

Keep in tightly closed container. Wash thoroughly after handling.

SECTION X - MISCELLANEOUS INFORMATION

Use with adequate ventilation. Avoid breathing dust. Do not get in eyes, on skin, or on clothing.

Date issued:_____ Revision:_____ Approved by R. M. Mitchell
Manager, Quality Assurance

NOV 14 1988

O-PHENANTHROLINE FERROUS SULFATE COMPLEX
O-PHENANTHROLINE FERROUS SULFATE COMPLEX
O-PHENANTHROLINE FERROUS SULFATE COMPLEX

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY CONTACTS:
GASTON L. PILLORI
(201) 796-7100

SUBSTANCE IDENTIFICATION

SUBSTANCE: O-PHENANTHROLINE FERROUS SULFATE COMPLEX

TRADE NAMES/SYNONYMS:
P-69;

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=0 REACTIVITY=0 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT:	O-PHENANTHROLINE, MONOHYDRATE CAS 5144-89-8	PERCENT: 1.2
COMPONENT:	FERROUS SULFATE, HEPTAHYDRATE CAS 7782-63-0	PERCENT: 1.2
COMPONENT:	WATER	PERCENT: 97.0

EXPOSURE LIMITS:
FERROUS SULFATE:
1 MG(FE)/M3 ACGIH TWA

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

PHYSICAL DATA

DESCRIPTION: LIQUID BOILING POINT: 212 F (100 C)

MELTING POINT: 32 F (0 C) SPECIFIC GRAVITY: 1.0

VAPOR PRESSURE: 14 (WATER) EVAPORATION RATE: (ETHER=1) >1

SOLUBILITY IN WATER: COMPLETELY VAPOR DENSITY: 0.7 (WATER)

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR STANDARD FOAM (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR STANDARD FOAM (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING:
NO ACUTE HAZARD. MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. AVOID BREATHING VAPORS OR DUSTS; KEEP UPWIND.

TOXICITY

PHENANTHROLINE, MONOHYDRATE:
CARCINOGEN STATUS: NONE.
PHENANTHROLINE MAY IRRITATE THE EYES, SKIN, AND MUCOUS MEMBRANES.

FERROUS SULFATE:
ANHYDROUS: 390 MG/KG ORAL-CHILD LDLO; 10,560 UG/KG ORAL-WOMAN TDLO; 20 MG/KG ORAL-CHILD TDLO; 150 MG/KG ORAL-CHILD TDLO; 600 MG/KG ORAL-WOMAN TDLO; 441 MG/KG UNREPORTED-MAN LDLO; 319 MG/KG ORAL-RAT LD50; 155 MG/KG SUBCUTANEOUS-RAT LD50; 680 MG/KG ORAL-MOUSE LD50; 289 MG/KG INTRAPERITONEAL-MOUSE LD50; 60,300 UG/KG SUBCUTANEOUS-MOUSE LD50; 112 MG/KG INTRAVENOUS-MOUSE LD50; 1200 MG/KG ORAL-GUINEA PIG LD50; 79 MG/KG INTRAVENOUS-DOG LD50; 200 MG/KG INTRADUODENAL-RABBIT LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).
MONOHYDRATE: NO DATA AVAILABLE.
HEPTAHYDRATE: 1389 MG/KG ORAL-RAT LDLO; 697 MG/KG RECTAL-RAT LDLO; 1520 MG/KG ORAL-MOUSE LD50; 250 MG/KG INTRAPERITONEAL-MOUSE LDLO; 51 MG/KG INTRAVENOUS-MOUSE LD50; 2778 MG/KG ORAL-RABBIT LDLO; 279 MG/KG SUBCUTANEOUS-RABBIT LDLO; 99 MG/KG INTRAVENOUS-RABBIT LDLO; MUTAGENIC DATA (RTEC). CARCINOGEN STATUS: NONE.
FERROUS SULFATE IS TOXIC IN THE ANHYDROUS FORM, BUT THE ORAL LETHAL DOSE FOR THE HEPTAHYDRATE IS LARGER THAN THAT DEFINED AS TOXIC. FERROUS SULFATE IS A SKIN AND MUCOUS MEMBRANE IRRITANT AND A SEVERE EYE AND GASTROINTESTINAL IRRITANT. POISONING MAY AFFECT THE LIVER. THE CONCURRENT USE OF VARIOUS DRUGS AND FERROUS SULFATE MAY CAUSE ADVERSE EFFECTS; TETRACYCLINES MAY DECREASE ITS EFFECTIVENESS, ANTACIDS MAY INTERFERE WITH ORAL IRON ABSORPTION, AND MERCAPTOPURINES MAY INCREASE HEPATOTOXICITY.

HEALTH EFFECTS AND FIRST AID

INHALATION:
PHENANTHOLINE, MONOHYDRATE:
IRRITANT.
ACUTE EXPOSURE- MAY CAUSE COUGHING, RESPIRATORY TRACT IRRITATION, DYSPNEA, AND PULMONARY EDEMA.
CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE MUCOUS MEMBRANE

IRRITATION.

FERROUS SULFATE:
IRRITANT.
ACUTE EXPOSURE- INHALATION MAY CAUSE IRRITATION WITH A TICKLING COUGH.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
PHENANTHOLINE, MONOHYDRATE:
IRRITANT.
ACUTE EXPOSURE- MAY CAUSE IRRITATION AND PAIN.
CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE DERMATITIS.

FERROUS SULFATE:
IRRITANT.
ACUTE EXPOSURE- CONTACT WITH THE SKIN MAY CAUSE MILD IRRITATION.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
PHENANTHOLINE, MONOHYDRATE:
IRRITANT.
ACUTE EXPOSURE- CONTACT MAY CAUSE REDNESS, PAIN, AND IRRITATION.
CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE CONJUNCTIVITIS.

FERROUS SULFATE:
CORROSIVE.
ACUTE EXPOSURE- CONTACT WITH THE EYE MAY CAUSE SEVERE IRRITATION AND CORROSIVE ACTION DUE TO THE ACIDITY OF THE SOLUTION.
CHRONIC EXPOSURE- DEPENDING ON CONCENTRATION AND DURATION OF EXPOSURE, SYMPTOMS MAY BE AS THOSE OF ACUTE EXPOSURE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
PHENANTHOLINE, MONOHYDRATE:
ACUTE EXPOSURE- MAY CAUSE NAUSEA AND IRRITATION OF THE GASTROINTESTINAL TRACT.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FERROUS SULFATE:
CORROSIVE/TOXIC.
ACUTE EXPOSURE- SIDE EFFECTS OF INGESTION MAY INCLUDE HEARTBURN, NAUSEA, UPPER GASTRIC DISCOMFORT, AND CONSTIPATION OR DIARRHEA. SYMPTOMS OF

SEVERE POISONING MAY OCCUR WITHIN 30 MINUTES OR BE DELAYED FOR SEVERAL HOURS. SEVERE GASTRITIS WITH ABDOMINAL PAIN, RETCHING, VIOLENT DIARRHEA, AND VOMITING MAY OCCUR. THE VOMITUS MAY BE BLOODY. DEHYDRATION MAY BECOME INTENSE. THE CIRCULATORY SYSTEM MAY BE AFFECTED WITH SYMPTOMS OF SHOCK, PALLOR, CYANOSIS AND COLDNESS. RAPID, WEAK OR IMPERCEPTIBLE PULSE, LOW BLOOD PRESSURE, RAPID AND SHALLOW RESPIRATION MAY OCCUR. CORROSIVE INJURY TO THE STOMACH MAY RESULT IN SUBSEQUENT PYLORIC STENOSIS OR GASTRIC SCARRING. IF POISONING IS NOT IMMEDIATELY FATAL, THE PATIENT MAY BE ASYMPTOMATIC FOR 24 HOURS, AFTER WHICH SYMPTOMS MAY RETURN WITH CYANOSIS, PULMONARY EDEMA, SHOCK, CONVULSIONS, ACIDOSIS, ANURIA, HYPERTHERMIA, COMA AND DEATH WITHIN 24-48 HOURS. LIVER NECROSIS MAY OCCUR 2 DAYS AFTER INGESTION. HUMAN REPORT OF INGESTION OF 40 MG/KG PRODUCED SOMNOLENCE, AGGRESSION, NAUSEA AND VOMITING. THE LETHAL DOSE FOR THE ANHYDROUS FORM WAS LOW AND WITHIN THE TOXIC RANGE; THE LETHAL DOSE FOR THE HEPTAHYDRATE WAS ABOVE THE LEVEL DEFINED AS TOXIC. THE WEIGHT OF THE WATER CONTENT OF THE HEPTAHYDRATE MAY ACCOUNT FOR THE DIFFERNCE IN THE LETHAL DOSES.

CHRONIC EXPOSURE- A TOTAL DOSE OF 7200 MG/KG GIVEN TO PREGNANT RATS PRODUCED FETAL DEATH.

FIRST AID- IF VICTIM IS CONSCIOUS, IMMEDIATELY GIVE 2 TO 4 GLASSES OF WATER, AND INDUCE VOMITING BY TOUCHING FINGER TO BACK OF THROAT. GET MEDICAL ATTENTION IMMEDIATELY.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
PHENANTHOLINE, MONOHYDRATE:

FERROUS SULFATE:
NO DATA AVAILABLE.

DECOMPOSITION:
THERMAL DECOMPOSITION MAY RELEASE TOXIC OXIDES OF SULFUR.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

****

CONDITIONS TO AVOID

NONE REPORTED.

****

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
ABSORB WITH VERMICULITE OR OTHER SUITABLE MATERIAL. PLACE IN A SUITABLE CONTAINER (PLASTIC), FOR LATER DISPOSAL.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE GENERAL DILUTION VENTILATION.

RESPIRATOR:
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON THE CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.
THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON THE DATA FOUND IN THE PHYSICAL DATA, HEALTH EFFECTS AND TOXICITY SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION:

CHEMICAL CARTRIDGE RESPIRATOR WITH AN ORGANIC VAPOR CARTRIDGE(S) WITH A FULL FACEPIECE.

GAS MASK WITH ORGANIC VAPOR CANISTER (CHIN-STYLE OR FRONT- OR BACK-MOUNTED CANISTER) WITH A FULL FACEPIECE.

TYPE 'C' SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE OR WITH A FULL FACEPIECE, HELMET OR HOOD OPERATED IN CONTINUOUS-FLOW MODE.

SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

-ADDITIONAL INFORMATION-

MATERIAL SAFETY DATA SHEET

PERCY HARMS CORPORATION
430 SOUTH WHEELING ROAD
WHEELING, IL 60090

PRODUCT NAME: SLIDE SPECIAL MOLD CLEANER CONCENTRATE

EMERGENCY TELEPHONE #: 312-680-2727
INFORMATION TELEPHONE #: 312-541-7220
D.U.N.S. NUMBER: 00-299-4168

REVISION DATE: 04-22-87
PRODUCT NUMBER: 51973

SECTION I. IDENTIFICATION

CHEMICAL NAME: NON-IONIC SURFACTANT
CHEMICAL FAMILY: ALIPHATIC HC DERIVATIVE
FORMULA: 51973
SYNONYMS:
DOT HAZARD CLASSIFICATION: NON-HAZARDOUS
DOT SHIPPING NAME: NO LABEL
CHEMICAL ABSTRACT REGISTRY NUMBER: PROPRIETARY BLEND
IDENTIFICATION NUMBER: NONE
H.M.I.S. RATING: 1,0,0,0

SECTION II. PHYSICAL DATA

BOILING POINT: NOT ESTABLISHED
FREEZING POINT: 15 DEGREES F.
SPECIFIC GRAVITY [H2O =1]: 1.03
WEIGHT PER GALLON @ 60 F.: 8.59
VAPOR PRESSURE @ 70 F. [MM HG]: NOT ESTABLISHED
VAPOR DENSITY [AIR = 1]: PRODUCT IS NON-VOLATILE
SOLUBILITY IN WATER, % BY WT.: 100%
PERCENT VOLATILE BY VOLUME: 0
EVAPORATION RATE [MINUTES]: N/A
APPEARANCE AND ODOR: RED LIQUID, MILD PINE ODOR

SECTION III. HAZARDOUS INGREDIENTS

MATERIAL:	APPROX. VOLUME %:	TLV [UNITS]:
NO KNOWN HAZARDOUS MATERIALS PRESENT		

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

FLAMMABLE LIMITS IN AIR: LEL: N/A UEL: N/A (VOLUME %)
FLASH POINT: 250 DEGREES F.
EXTINGUISHING MEDIA: A,B,C, ALL CLASS POWDER
SPECIAL FIRE FIGHTING PROCEDURES: NONE

UNUSUAL FIRE & EXPLOSION HAZARDS: NONE

SECTION V. REACTIVITY DATA

STABILITY: STABLE
INCOMPATIBILITY [MATERIALS TO AVOID]: STRONG OXIDIZING AGENTS
HAZARDOUS COMBUSTION BY-PRODUCTS:
HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION V. REACTIVITY DATA [CONT'D.]

JNDITIONS TO AVOID:

SECTION VI. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: NOT ESTABLISHED

* EFFECTS OF OVEREXPOSURE *

INHALATION: N/A
SKIN CONTACT: MAY CAUSE IRRITATION
EYE CONTACT: TEMPORARY IRRITANT

* EMERGENCY AND FIRST AID PROCEDURES *

SKIN: WASH WITH SOAP AND WATER, APPLY HANDCREAM
INHALATION: N/A
EYES: WASH THOROUGHLY WITH COLD CLEAN WATER FOR 15 MINUTES. CONSULT PHYSICIAN IF IRRITATION PERSISTS

SECTION VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: USE ABSORBANT COMPOUND TO REMOVE, OR FLUSH INTO SEWER AS PERMITTED.

WASTE DISPOSAL METHOD: INCINERATE OR LANDFILL AS PERMITTED BY LOCAL, STATE, OR FEDERAL REGULATIONS

SECTION VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION [SPECIFY TYPE]: NOT NEEDED
VENTILATION: N/A
PROTECTIVE GLOVES: MAY BE USED
EYE PROTECTION: PROPER EYE CARE SHOULD BE PRACTICED IN ALL IND. OPERATIONS.
OTHER PROTECTIVE EQUIPMENT: AS REQUIRED BY YOUR COMPANY

SECTION IX. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: STORE INDOORS, AVOID FREEZING STORE AT TEMPERATURES BELOW 120 DEGREES F.
OTHER PRECAUTIONS:

THIS DATA IS OFFERED IN GOOD FAITH AS TYPICAL VALUES AND NOT AS A PRODUCT SPECIFICATION. NO WARRANTY, EXPRESS OR IMPLIED, IS HEREBY MADE. THE RECOMMENDED INDUSTRIAL HYGIENE AND SAFE HANDLING PROCEDURES ARE BELIEVED TO BE GENERALLY APPLICABLE. HOWEVER, EACH USER SHOULD REVIEW THESE RECOMMENDATIONS IN THE SPECIFIC CONTEXT OF THE INTENDED USE, AND DETERMINE WHETHER THEY ARE APPROPRIATE. THE INFORMATION CONTAINED IN THIS MATERIAL SAFETY DATA SHEET IS BELIEVED TO BE CORRECT AS OF THIS DATE. THE REGULATIONS PROMULGATED BY OSHA FOR HAZARD COMMUNICATION, 29 CFR 1910.1200, AS WELL AS SEVERAL STATE AND LOCAL LAWS AND REGULATIONS, HAVE BEEN CONSIDERED IN PREPARING THIS M.S.D.S.

MATERIAL SAFETY DATA SHEET

J. T. Baker Chemical Co., 222 Red School Lane, Phillipsburg, N.J. 08865

CHEMICAL NAME

SECTION I . IDENTIFICATION OF PRODUCT

CHEMICAL NAME	FORMULA
Phosphoric Acid	H_3PO_4
SYNONYM OR CROSS REFERENCE: o-phosphoric acid	CAS NO: 7664-38-2 EPA NO: B380-4426

SECTION II . HAZARDOUS INGREDIENTS

MATERIAL		NATURE OF HAZARD

SECTION III . PHYSICAL DATA

BOILING POINT 261°C	MELTING POINT 42.35°C
VAPOR PRESSURE @ 20°C 0.28 mm	SPECIFIC GRAVITY 1.83
VAPOR DENSITY (AIR=1)	PERCENT VOLATILE BY VOLUME (%)
WATER SOLUBILITY Very	EVAPORATION RATE (_____= 1)
APPEARANCE Colorless transparent liquid	

SECTION IV . FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (method used)	FLAMMABLE LIMITS	Lower	Upper

FIRE EXTINGUISHING MEDIA

SPECIAL FIRE-FIGHTING PROCEDURES

UNUSUAL FIRE AND EXPLOSION HAZARD

SECTION V . HEALTH HAZARD

THRESHOLD LIMIT VALUE

1.0 mg/M^3 orl-rat LD_{50}: 1530 mg/kg

HEALTH HAZARDS

POISON Chemical is corrosive and causes burns.

FIRST AID PROCEDURES If swallowed, give tap water, milk or milk of magnesia. Give whites of eggs beaten with water. Call a physician. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. For skin contact, immediately flood with water, then water containing sodium bicarbonate. Call a physician.

SECTION VI . REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	

INCOMPATABILITY (materials to avoid)

Can react with metals to liberate hydrogen, a flammable gas.

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII . SPILL AND DISPOSAL PROCEDURES

SPILLS

Cover the contaminated surface with sodium bicarbonate or a soda ash-slaked lime mixture (505 (50-50). Mix and add water if necessary to form slurry. Scoop up slurry. Alternatively use J. T. Baker's NEUTRASORB® (Product 4456).

DISPOSAL

Contact a professional disposal service.

SECTION VIII . PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)

Self-contained breathing apparatus.

VENTILATION	LOCAL	SPECIAL
	X	
	MECHANICAL (general)	OTHER
	X	

PROTECTIVE GLOVES	EYE PROTECTION
Rubber	

OTHER PROTECTIVE EQUIPMENT

Approved working clothes.

SECTION IX . HANDLING AND STORAGE PRECAUTIONS

STORAGE & HANDLING

Do not get in eyes, on skin, on clothing. Avoid breathing vapor. Keep in tightly closed container. Loosen closure cautiously. Wash thoroughly after handling.

SECTION X . MISCELLANEOUS INFORMATION

(4)

Date issued: 1/23/77

Approved by _____
Manager, Quality Assurance

Revision No. & Date Issued: _____

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME: Shipley Company Inc.	EMERGENCY TELEPHONE NO.: (617) 969-5500
ADDRESS (Number, Street, City, State, and ZIP Code): 2300 Washington Street, Newton, Massachusetts 02162	
CHEMICAL NAME AND SYNONYMS: n.a.	TRADE NAME AND SYNONYMS: PHOTOPOSIT® 303A DEVELOPER
CHEMICAL FAMILY: n.a.	FORMULA: Proprietary

SECTION II HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS n.a.			BASE METAL n.a.		
CATALYST n.a.			ALLOYS n.a.		
VEHICLE n.a.			METALLIC COATINGS n.a.		
SOLVENTS n.a.			FILLER METAL PLUS COATING OR CORE FLUX n.a.		
ADDITIVES n.a.			OTHERS n.a.		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Sodium hydroxide	5	2mg/M^3

SECTION III PHYSICAL DATA

BOILING POINT (°F.)	> 212	SPECIFIC GRAVITY (H_2O=1)	~ 1.1
VAPOR PRESSURE (mm Hg.)	n.a.	PERCENT VOLATILE BY VOLUME (%) Water based solution	n.a.
VAPOR DENSITY (AIR=1)	n.a.	EVAPORATION RATE (_____ =1)	n.a.
SOLUBILITY IN WATER	Complete		
APPEARANCE AND ODOR	Brown liquid with no noticeable odor		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	Non-flammable	FLAMMABLE LIMITS	Lel	Uel
			n.a.	n.a.
EXTINGUISHING MEDIA	Water, CO_2, Dry chemical			
SPECIAL FIRE FIGHTING PROCEDURES	None			
UNUSUAL FIRE AND EXPLOSION HAZARDS	None			

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE	2 mg/M^3 - based on sodium hydroxide
EFFECTS OF OVEREXPOSURE	As for sodium hydroxide
EMERGENCY AND FIRST AID PROCEDURES	Swallowing: Contact physician immediately; Eye Contact: Flush with water for 15 minutes - contact physician; Skin Contact: Flush with copious amounts of water; Inhalation: Move to fresh air.

SECTION VI REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	Do not store near acids
INCOMPATABILITY *(Materials to avoid)*	Acids		
HAZARDOUS DECOMPOSITION PRODUCTS	Neutralization produces heat		
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	None

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED	Flush area with cold water into Waste Treatment System.
WASTE DISPOSAL METHOD	Contact Shipley Technical Services Department

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*	n.a.		
VENTILATION	LOCAL EXHAUST		SPECIAL
	MECHANICAL *(General)*	Room Exhaust	OTHER
PROTECTIVE GLOVES	Yes	EYE PROTECTION	Yes
OTHER PROTECTIVE EQUIPMENT	Suitable protective clothing		

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING	Treat as a solution of sodium hydroxide. Store in a dry area at 50-90F. Do not store in direct sunlight. Keep sealed when not in use.
OTHER PRECAUTIONS	

Shipley Company Inc.
2300 Washington Street
Newton, Massachusetts 02162
Emergency Phone: (617) 969-5500

EFFECTIVE DATE: 15 November 1985

PRODUCT NAME: PHOTOPOSIT® 503 DEFOAMER

PRODUCT CLASS: Defoaming Compound

SECTION I - HAZARDOUS COMPONENTS

COMPONENT	CAS NO.	WEIGHT PERCENT	ACGIH TLV ppm(mg/m3)	CARCINOGEN STATUS
Proprietary ingredients,not deemed hazardous per OSHA Hazard Communication Standard.	N.A.	100	N.A.	N.A.

SECTION II - PHYSICAL DATA

BOILING POINT: Approx. 212°F.
VAPOR PRESSURE (mmHg): 30mm
% VOLATILE BY VOL: greater than 40%
EVAPORATION RATE : Slower than ether
VAPOR DENSITY(AIR=1): N.A.
APPEARANCE AND ODOR: White liquid with slight odor.
SPECIFIC GRAVITY: Approx. 1.0
SOLUBILITY IN WATER: greater than 90%
pH: Approx. 3 - 5.5

SECTION III - PHYSICAL HAZARDS

DOT PROPER SHIPPING NAME: Not Regulated
DOT HAZARD CLASSIFICATION: Not Regulated
DOT HAZARD IDENTIFICATION NUMBER: Not Regulated

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: Nonflammable
METHOD USED: N.A.
LOWER EXPLOSION LIMIT: N.A.
EXTINGUISHING MEDIA: Carbon dioxide or foam.
SPECIAL FIRE FIGHTING PROCEDURES: N.A.
UNUSUAL FIRE AND EXPLOSION HAZARDS: N.A.

REACTIVITY DATA

STABILITY: Stable
CONDITIONS TO AVOID: Store away from strong oxidants.
INCOMPATIBILTY: May react with strong oxidizing agents.
DECOMPOSITION PRODUCTS: Silicon dioxide, carbon dioxide and traces of incompletely burned carbon products.
HAZARDOUS POLYMERIZATION: Will not occur.

MATERIAL SAFETY DATA SHEET

Shipley Company Inc, Newton, Massachusetts 02162
Emergency Phone: (617) 969-5500
PHOTOPOSIT® 503 DEFOAMER

SECTION V - HEALTH HAZARDS

EXPOSURE LIMITS: Not established. Avoid exposure to mists or vapors.
ROUTES OF ENTRY: Inhalation, ingestion, eye and skin contact.
ACUTE EFFECTS: Contact with eyes may cause temporary discomfort. Contact with skin may cause irritation.
CHRONIC EFFECTS: N.A.
EMERGENCY FIRST AID PROCEDURES:
INGESTION: Contact physician immediately.
EYE CONTACT: Flush with water immediately for at least 15 minutes, then contact a physician.
SKIN CONTACT: Flush skin with plenty of water. Contact a physician if irritation persists.
INHALATION: Move to fresh air.

SECTION VI - SPILL, LEAK AND DISPOSAL PROCEDURES

ACTION TO TAKE FOR SPILLS: Spills may be absorbed with appropriate absorbent material and placed in container for disposal. Flush area with cold water into waste treatment system.
DISPOSAL METHOD: Dispose of in accordance with all federal, state and local regulations. Contact Shipley Technical Service Representative if further assistance is needed.

SECTION VII - PRECAUTIONS FOR SAFE USE AND HANDLING

VENTILATION: Provide adequate general or local exhaust ventilation.
RESPIRATORY PROTECTION: None normally required if adequate exhaust ventilations is provided. In situations where dusts, mists or vapors may form (such as spraying), use a NIOSH/MSHA approved respirator.
EYE PROTECTION: Chemical goggles.
PROTECTIVE CLOTHING: Chemical gloves and suitable protective clothing to prevent skin contact.
WORK PRACTICES: Avoid skin contact. Practice good personal hygiene to prevent accidental exposure.

SECTION VIII - SPECIAL PRECAUTIONS AND ADDITIONAL INFORMATION

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store in closed original container in a cool, dry area at 50-90°F. Store away from strong oxidizing agents. Do not store in direct sunlight. Keep container closed when not in use.

N.A. Denotes no applicable information was found.

THE INFORMATION AND RECOMMENDATIONS CONTAINED HEREIN ARE BELIEVED TO BE ACCURATE. HOWEVER, NO GUARANTEE OR WARRANTY, EXPRESSED OR IMPLIED IS GIVEN.

PREPARED BY: Angela Bogge
Corporate Environmental Health and Safety

118501

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME: Shipley Company Inc.	EMERGENCY TELEPHONE NO.: (617) 969-5500
ADDRESS (Number, Street, City, State, and ZIP Code): 2300 Washington Street, Newton, Massachusetts 02162	
CHEMICAL NAME AND SYNONYMS: n.a.	TRADE NAME AND SYNONYMS: PHOTOPOSIT® REMOVER 1112A
CHEMICAL FAMILY: n.a.	FORMULA: Proprietary

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS n.a.			BASE METAL n.a.		
CATALYST n.a.			ALLOYS n.a.		
VEHICLE n.a.			METALLIC COATINGS n.a.		
SOLVENTS glycol ethers	75	50 ppm	FILLER METAL PLUS COATING OR CORE FLUX n.a.		
ADDITIVES n.a.			OTHERS n.a.		
OTHERS n.a.					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Ethanolamine	15	3 ppm

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	> 212°F	SPECIFIC GRAVITY (H_2O=1)	~ 0.96
VAPOR PRESSURE (mm Hg.)	n.a.	PERCENT, VOLATILE BY VOLUME (%)	n.a.
VAPOR DENSITY (AIR=1)	n.a.	EVAPORATION RATE (_____ =1) Butyl Acetate=1	< 1
SOLUBILITY IN WATER	complete	pH	~12
APPEARANCE AND ODOR			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) approx. 179°F(PM CC)	FLAMMABLE LIMITS	Lel unknown	Uel unknown
EXTINGUISHING MEDIA: Water, CO_2, dry Chemicals			
SPECIAL FIRE FIGHTING PROCEDURES: Self contained breathing apparatus recommended.			
UNUSUAL FIRE AND EXPLOSION HAZARDS: Excessive heat can cause combustible vapors to be evolved.			

(Continued on reverse side)